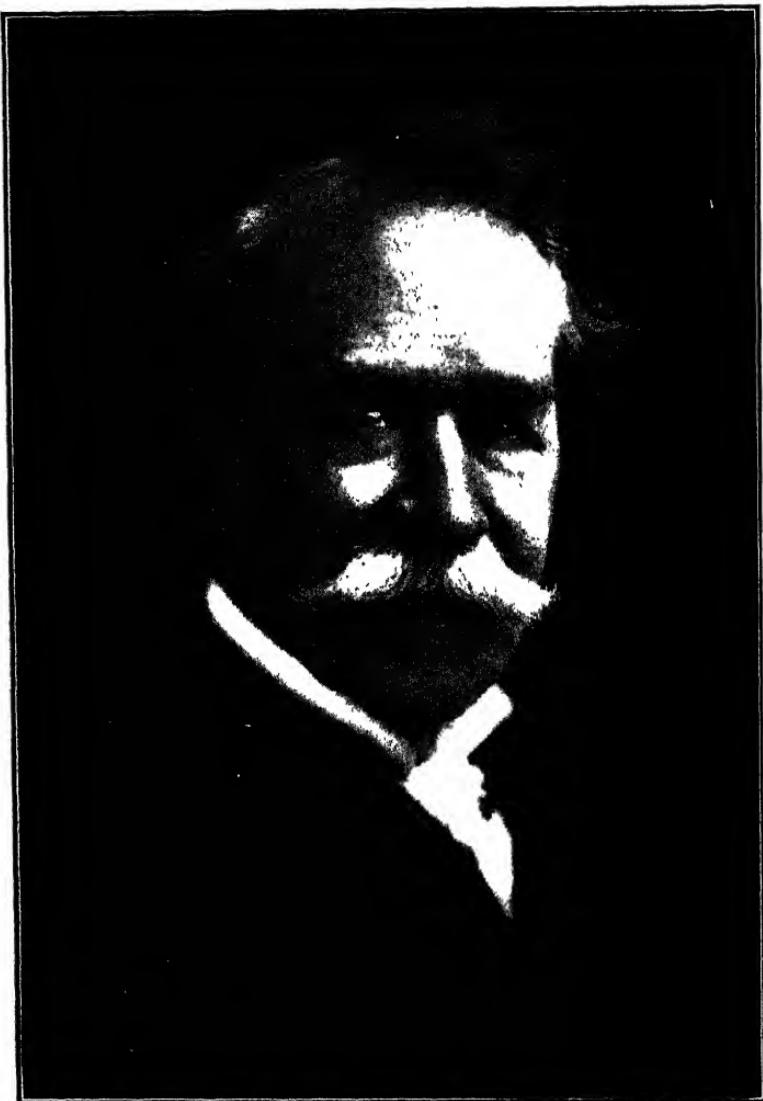


ENT. NEWS, Vol. XXVIII.

Plate I.



OTTO HEIDEMANN.

(PHOTOGRAPH BY J. H. PAYNE, U. S. BUREAU OF ENTOMOLOGY.)

ENTOMOLOGICAL NEWS

AND

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Otto Heidemann.

(Plate I)

We give in this number a portrait of the well-known Hemipterist, Otto Heidemann, for many years a member of the United States Bureau of Entomology, and Honorary Custodian of *Hemiptera* in the National Museum, who died November 17, 1916, after an operation at the Homeopathic Hospital in Washington, D. C.

Heidemann was born in Magdeburg, Germany, on September 1, 1842. He learned the art of wood-engraving and practiced this profession in Leipsic, Vienna, Munich, Stuttgart and Berlin until 1873, when he came to this country and established an engraving office in Baltimore. In 1876 he moved his office to Washington and in the following years furnished many illustrations for various Government publications. In 1880 he entered the office of Captain G. Wheeler's *Topographical*

cal Survey west of the 100th Meridian and in 1883 was appointed engraver in the U. S. Department of Agriculture. From this time his work became known in Entomology and a large number of excellent illustrations of economic insects, published by the Department are the work of Mr. Heidemann.

With the development of photo-engraving his art ceased to be useful and in 1898 he obtained a position as assistant in the Bureau of Entomology becoming a specialist in Hemiptera, the study of which he had taken up only half a dozen years before, under the guidance and inspiration of his friends Albert Koebele, E. A. Schwarz and Theodore Pergande.

Although he thus began his entomological studies when he was well beyond fifty years of age, he applied himself with such zeal to the science, that he became known all over the world as an authority on Hemiptera.

Heidemann was a member of the Entomological and Biological Societies of Washington, and of the American Association of Economic Entomologists; he was a charter member of the Entomological Society of America and a Fellow of the American Association for the Advancement of Science. He was elected President of the Washington Entomological Society for two consecutive years 1909, 1910.

His entomological writings number about 35 titles.

Mr. Heidemann is survived by his wife, Mrs. Mica Heidemann, well known as a sculptress and as a maker of insect models.

X.

A Further Note on *Zonocerus elegans* (Orth.).

[Since the publication of the article on this grasshopper in the News for November, 1916, pages 420-421, the following has been received.]

There is usually one generation a year, but a partial second one, consisting of a few individuals reaching the last nymphal instar, is found in favorable years and a few localities. The first instar nymphs appear from the middle of September onwards, being plentiful early in October. The five nymphal stages are completed by January 1. The difference here noted is due to my previous observations covering only one season and that an exceptionally favorable one.—S. G. RICH, Adams Mission Station, Natal, South Africa.

New and Noteworthy Forms of North American Miridae (Hemip.)*

By HARRY H. KNIGHT, Ithaca, New York.

In working over considerable miscellaneous material in the family *Miridae* the writer has found a few species that are of particular interest and takes occasion to present part of his findings in the present paper.

Sericophanes ocellatus Reuter.

While studying *Miridae* in the collection of the United States National Museum the writer found two specimens bearing the label, "Texas Belfrage" which evidently represent original type material of this species. These specimens came from the C. V. Riley collection and no doubt were acquired from Mr. Belfrage at a time when that collector sent material to various entomologists and museums. Dr. Reuter described the genus *Sericophanes* and the single species *ocellatus* in his paper of 1875, "Capsinae ex America boreali in Museo Holmieni asservatae descriptae ab" (*Öfversigt af Kongl. Vetenskaps-Akademiens Förhandlingar*, 1875, No. 9, Stockholm), from an assemblage of North American Hemiptera collected by Mr. Belfrage and which in some way were acquired by the Stockholm Museum. It was this wholesale shipment of North American Hemiptera to European specialists in the early days that resulted in the description of many of our species. This loss of types to American students has made it difficult to always name our species accurately and some may never be known with certainty until comparison is made with the type specimens.

The following notes are taken from a study of the above type material and are given here for comparison with the northern species described below:

♂. Length to tip of membrane, .26 mm.; length of pronotum .43 mm., width at base .71 mm., apex .37 mm.; head, width across the eyes .60 mm., width of vertex .25 mm.; color of head, thorax, legs and ab-

*Contribution from the Department of Entomology of Cornell University.

domen, yellowish brown, or "dilute cinnamomeus" of Reuter. The ocellate spot on the clavus and the pruinose bands across the corium are quite similar to *noctuans* but the ground color is lighter.

Dr. Reuter, 1910, placed the genus *Sericophanes* in his division *Cremnocephalaria*, a group having the claws destitute of arolia. Perhaps Dr. Reuter had poor material from which to work since the present writer finds after observations on

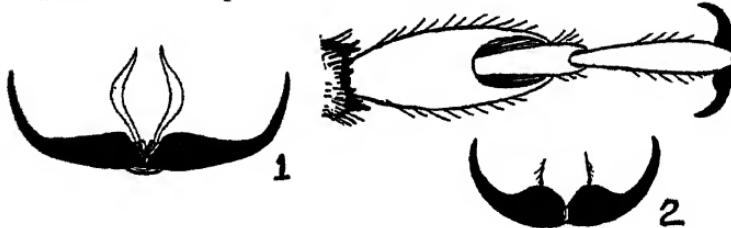


Fig. 1.—*Sericophanes noctuans*, showing the claws and type of arolia.

Fig. 2.—*Largidea davisi*, tarsus and claws, showing type of claws and absence of arolia.

several specimens with the aid of the binocular microscope that the claws bear free arolia with converging tips (fig. 1). This type of arolia places the genus close to *Pilophorus* and *Ceratocapsus* and in the tribe *Orthotylini* of Mr. Van Duzee's recent tables.

Sericophanes noctuans new species.

Larger and darker colored than *ocellatus*, but otherwise bearing a close resemblance.

♂. Length, 3.6 mm. Head: width across the eyes .71 mm., width of vertex .28 mm., length .45 mm., height at base .37 mm.; eyes large and coarsely granulated, height .43 mm., dark purplish brown in color; jugae, lorae, and tylus reddish brown, the jugae showing red most plainly; vertex dark chestnut like the pronotum, smooth shining, carina nearly horizontal and turning forward at each side to meet the eye, slightly depressed bordering the carina; base of the tylus with a prominent hair at each side. Rostrum scarcely attaining the posterior margin of the hind coxae, yellowish brown, basal segment dark brown, the apex blackish.

Antennae: segment I, length .25 mm., yellowish brown, with three or four prominent hairs on the inside; II, length 1.25 mm., yellowish brown, slightly darker toward the apex; III, length .88 mm., dark fuscous to blackish brownish at the base; IV, length .60 mm., slightly flattened, dark purplish to blackish; all the segments with very fine pale pubescence.

Pronotum: length .57 mm., width at base .88 mm., apex .37 mm.; dark chestnut or blackish, smooth, shining, strongly declivitous, devoid of calli, collar narrow but distinct, lateral margins of the disk indistinct, rounded. Scutellum same color as the pronotum, basal lobe prominent, strongly sloping backward, sharply cut away at each side; apical lobe small, moderately arched and rounded at the sides, very finely transversely rugose. Sternum dark chestnut, shining; lobe of the metasternal orifice projecting laterally very strongly.

Hemelytra: width at tip of corium .91 mm., across the middle only .77 mm.; clavus dark chestnut brown on the basal half and tip, golden brown bordering the scutellum, pruinose on the exterior basal half; apical half of the clavus with a cream colored spot which extends laterally to the margin; corium dark velvety brown, the cuneus and inner apical angles of corium with dark golden brown; base of corium, a narrow band across the middle, and exterior half of the apex, pruinose; sparsely covered with golden hairs; cuneus poorly defined from the corium inside of the fracture, scarcely deflected; membrane evenly clouded, pale across the basal half of the large cells and bordering the apical one-third of the cuneus.

Legs: fore coxae yellowish brown like the femora, darker at the very base; middle coxae dark brown; hind coxae pale, brownish at the base; femora dark yellowish brown, anterior pair paler; tibiae dark brown; tarsi pale brown, the apex and claws blackish.

Venter: long and slender, noticeably flattened on the basal half, first two segments yellowish brown, beyond this dark chestnut to blackish, shining; genital claspers small.

Described from 9 ♂♂, June 22 to Aug. 10, Batavia, New York, all of which came to the light in the writer's laboratory; 1 ♂, July 2, McLean, New York.

Type: ♂, Aug. 8, Batavia, New York; author's collection.

Mr. C. P. Alexander reports having seen this species flying up in large numbers from the grass after sundown. Brachypterous and macropterous females of what is doubtless this species rather than the *ocellatus* from Texas, are well described by Prof. Osborn (Proc. Iowa Acad. Sci., V, p. 238, 1898); the nymphs and adults found occurring on grassy ridges.

Clivinema regalis new species.

Bright orange red with blackish hemelytra, antennae and tibiae; structurally quite similar to *villosa* but differing greatly in size and color, the pubescence without prominent recurved tips. Claws toothed

at the base, destitute of arolia, similar in structure to *villosa*. Pronotum with an apical gibbosely convex area, stricture apparent only at the sides from which an impressed line extends to the rear margin of the calli.

♂. Length 5.7 mm. *Head*: width across eyes 1.05 mm., width of vertex .54 mm., length .51 mm., height at base .60 mm.; pale pubescent, vertex convex, ecarinate; orange red, tylus and a transverse impression at the base black, sutures and eyes blackish, vertex usually with two longitudinal fuscous to blackish rays. Rostrum scarcely attaining the posterior margin of the sternum, blackish, the first two segments mostly reddish.

Antennae: segment I, length .43 mm., width .14 mm., blackish, sometimes with reddish; II, length 2.05 mm., width .14 mm., quite uniformly thickened, black, thickly clothed with short black hairs; III, length .60 mm., slender, width .06 mm., black, only a few hairs with very fine pubescence; IV, length .40 mm., similar to III.

Pronotum: length 1.42 mm., width at base 1.99 mm., apex .80 mm., height at apex .91 mm.; bright red or orange red when faded; disk shallowly punctate, more or less transversely rugose; calli apparent as impressed ovals, usually black, shining, joined at the side by an impressed line leading to the anterior angles, thus defining the arched apical portion or gibbosely convex hood; coxal cleft extending high as the lateral margin of the disk, separated from the above impressed line only by a thin lateral projection. Scutellum bright red, pubescent, strongly convex, arched, with a broad median longitudinal impression. Sternum red, side pieces covered with a white flocculent wax-like material, often present in greater degree along the full length of the body.

Hemelytra: greatest width 2 mm., black, shining, somewhat translucent, roughly wrinkled, covered with long erect pale pubescence. Membrane evenly clouded with fuscous, except a pale spot at the apex of the cuneus, veins dark fuscous.

Legs: bright red, shining, apices of the femora and a longitudinal bar or row of dots on the under side, blackish; tibiae and tarsi black.

Venter: red, pale pubescent; genital claspers blackish, dextral clasper small, sinistral clasper long and slender, quite similar to that in *Largidea rubida* and *davisi*.

♀. Length 5.6 mm., width 2.5 mm., more robust than the male; second antennal segment more slender, thickest at the apex; vertex with two longitudinal black rays; the femora more so and the posterior margins of the abdominal segments and surrounding the ovipositor, blackish; entire body above and below coated with the white flocculent wax like material.

Described from 3 ♂♂ and 3 ♀♀, July 21-28, 1914, El

Paso, Texas, collected by Dr. J. Chester Bradley, who remarks: "Females were plump and very sluggish; collected from a shrub on the open mesa, possibly an Ocatilla which was in leaf at that time, on the side of Mt. Franklin not far outside the city limits of El Paso."

Type: ♂, July 28, El Paso, Texas, J. Chester Bradley; Cornell University collection.

Largidea davisi new species.

Resembles *grossa* in size and color but differs widely in the form of the antennae and the length of the rostrum; dark fusco-rufus brown, head and body covered with heavy pale yellowish pubescence, more or less matted and depressed. Length 6 mm.

♀. Head: width across eyes .28 mm., width of vertex .77 mm., length .51 mm., height at base .80 mm.; impunctate, darker than color of the body, the vertex and sutures about the tylus, blackish; base of tylus clearly defined, a short narrow longitudinal pit at the base similar to that in *rubida*; a prominent fovea just above the base of each antenna, vertex ecarinate, head shorter and more compressed as compared with *rubida*. Rostrum extending only slightly beyond the posterior margin of the fore coxae, or to the middle of the sternum; the same in both sexes.

Antennae: segment I, length .31 mm., greatest thickness .14 mm., dark rufus-brown, the apex and base blackish; II, length .28 mm., being exactly the width of the head, or less than the length of the pronotum, greatest thickness .14 mm., fusiform, not flattened as in *grossa* or with depressions of any kind, thickly clothed with dark brown hairs, a few bristles intermixed, rich rufus-brown to wine color, darker toward the apex; III, length .37 mm., with dark fuscous; IV, .37 mm., same color as III.

Pronotum: length 1.59 mm., width at base 2.19 mm., apex 1.14 mm., dark fusco-rufus, the polished hook-shaped line about the calli, black; calli as in *rubida*, typical of the generic characters; disk behind the calli coarsely, deeply and closely punctate, more finely punctured before the calli; lateral margins sharply defined as in *rubida*. Scutellum roughly transversely rugose along a slightly sulcate median line. Sternum with longitudinal median impressed line, opaque beneath with a few scattered pubescent hairs, shining at the sides and with matted pubescence.

Hemelytra: greatest width, ♀, 2.5 mm., ♂, 2.1 mm.; clavus, corium, and cuneus uniformly colored dark reddish brown, inclined to wine color in the more translucent parts; membrane evenly shaded with fuscous, veins darker tinged with reddish; closely covered with fine

and shallow punctures; clothed with short oppressed yellowish pubescence.

Legs: dark fuscous brown, femora with a longitudinal row of dark spots beneath, not visible in certain lights; tarsi blackish, the basal segment flattened beneath and extending well under the second segment (fig. 2).

Venter: mostly dark grayish brown, blackish on the posterior margin of each segment; spiracles conspicuous, appearing as sunken black spots; rather long and prominent pale yellowish pubescence.

♂. Similar to the female only more slender: length 5.7 mm. The antennae and character of the first tarsal segment do not differ from those of the female, though the length of the second antennal segment (1.28 mm.) is slightly longer than the width of the head (1.14 mm.) across the eyes. The male genital forceps are quite similar to those of *rubida* thus not affording good specific characters but on the other hand showing generic relationship.

Described from a male and three females, Sept. 24, 25, Promised Land, Long Island, New York, collected by Mr. William T. Davis and Mr. G. P. Engelhardt. I have also seen a half dozen other specimens from the same locality.

Type: ♀, Sept. 24, Promised Land, Long Island, New York, Wm. T. Davis; author's collection.

The writer has studied Uhler's type specimen of (*Clivinema*) *rubida* in the National Museum collection and was unable to distinguish from it Colorado specimens which were later determined as *marginata* by Mr. Van Duzee. It is evident that the character of the antennae and the length of the rostrum cannot be taken as generic characters but only as specific, since these differ in each of three species. The form of the pronotum and particularly the character of the calli and basal segment of the tarsi appear to be distinctive of the genus *Laridea*.

Correction of the Specific Name of a Dragonfly (Odon.).

Metaleptobasis brysonima Williamson, Proc. U. S. Nat. Mus. Vol. 48, 1915, p. 602. On September 4, 1916, Dr. Calvert wrote me that in the Kew Index he found no generic plant name *Brysonima*, but a *Byrsonima*, and in Pittier's list of Costa Rican plants two species of *Byrsonima* are recorded. Under date of October 9, he writes me that he believes a correction of the specific name of the dragonfly is permissible under Article 19, Intern. Rules Zool. Nomenclature. This correction is hereby proposed and the name changed from *Metaleptobasis brysonima* to *Metaleptobasis byrsonima*.—E. B. WILLIAMSON.

Notes on the Penes of Damselflies (Odonata).

No. 2. The Close Relations inter se of the Hawaiian Agrionines.

By CLARENCE HAMILTON KENNEDY, Cornell University.

(Plates II and III.)

In my first paper* I discussed a genus (*Acanthagrion*) in which the various forms comprising it were so close in color and structure that many had been considered but varieties until a study of the penes showed each form to be a good species structurally, for the penes of the various species were remarkably different.

In this paper I wish to discuss a group, the Hawaiian Agrionines, in which just the opposite relation holds. In venation, color, size, and in the structure of the male claspers the Hawaiian Agrionines differ radically among themselves but the penes throughout are the same type.

This opportunity came recently while in Philadelphia when I had the privilege of examining the penes of nineteen species and varieties of Hawaiian Agrioninae. These were a series of specimens collected by Dr. R. C. L. Perkins, and given by him to Dr. P. P. Calvert. In all cases the determinations are those of Dr. Perkins and so probably agree with his published articles.† Lack of time prevented an examination of the specimens other than of the penes. As the number of specimens was small, in some cases there being only a single male or female, an attempt to study the specimens with a view to possible grouping would have been inadvisable as Dr. Perkins' own studies of this group show great ranges in variation in many of the species.

Ever since I first looked over the list of Hawaiian Odonata, I had been skeptical that twenty-four species of damselflies, the entire damselfly fauna of this isolated region, should be comprised in but two genera. Later, when I first glanced at the box of specimens on which this study is based, I felt certain that there were at least three genera and probably more.

* Ent. News, xxvii, 325-330, July, 1916.

† Fauna Hawaiana. Vol. I, p. cixxv.; Vol. II, pp. 63-77, and 693-696. R. C. L. Perkins.

The large red forms with the richly veined wings, appeared at first sight more than generically distinct from the various small dark species and my interest and surprise increased steadily as I examined species after species and found throughout almost identical penes. The study of the penes but confirms the opinions expressed by McLachlan* and Perkins that in spite of their diverse forms these Hawaiian species of Agrionines are so closely related *inter se* that it is questionable whether they should not remain as a single genus.

The figs. 1 to 38 show, better than I can describe, the uniformity in structure throughout this group. Probably it extends to those Hawaiian species in which the penis has not yet been examined.† This form of penis is peculiar among agri-nine penes in that the third or apical segment is offset, or attached subapically to the second segment. The apical lobe has an apical, sagittal cleft, which in all but three species is at least half the length of the lobe in depth. All have the internal soft fold, but in all the terminal soft fold of segment two is lacking, unless it is homologous with that part of the apex of segment two which lies beyond the insertion of segment three. All degrees of spininess exist from no spines to a complete row along each side of the shaft.

The following classification is that of Perkins‡ and is based on the male appendages as the most constant character:—

- Group 1. *xanthomelas, pacificum, nigrohamatum.*
- Group 2. *oresitrophum, orobates, leptodemas, calliphya.*
- Group 3. *koelense, asteliae, amauropyrum, eudytum, adytum.*
- Group 4. *nesiotes.*
- Group 5. *oahuense.*
- Group 6. *deceptor, vagabundum, kauaiense, molokaicnse, jugorum.*
- Group 7. *oceanicum, blackburni, heterogamias.*

This does not include *calverti* or *williamsoni* the relationships of which species Perkins does not indicate.

* Ann. and Mag. Nat. Hist. (5), Vol. 12, p. 240.

† While studying the collection in the Museum of Comparative Zoology, Cambridge, Mass., I was able to examine *molokaicnse* and the *fallax* and *waianaeanum* varieties of *amaurodytum*. These all have the typical form of penis for this group.

‡Fauna Hawaiensis, Vol. II, p. 694.

In this paper I have used *Megalagrion* for these Hawaiian forms. The genus *Megalagrion* was established by McLachlan* for *blackburni* and *oceanicum*, with *blackburni* the type of the genus. Perkins later described *heterogamias* and considered it a close relative of these. He also pointed out that certain individuals of species in Group 6, especially of *kauaiense*, showed the venational characters of *Megalagrion*, thus preventing the use of this generic name to set off these three with the richly veined wings from the other Hawaiian forms. Perkins placed the entire group in the old genus *Agrion*, now *Coenagrion*. Studies of the penes in these forms show that the genus *Coenagrion* can probably be broken up and that these Hawaiian species are a compact group quite distinct from the other groups. As *Megalagrion* has been used for some of these Hawaiian species, it will then become applicable to the entire series of Hawaiian Agrionines as I have used it.

I had hoped that the penes more than the other characters might give some clue to the relationship and probable origin of this group. The penes do show that these Hawaiian Agrionines in spite of the great range in their appearance and structure are a compact group and undoubtedly have been derived from some single ancient immigrant that had strayed into the islands. It lines the Odonata up with what is already known about the birds (Drepanidae), the land snails (Achatinellidae) and those orders of insects in which there are large endemic genera with apparently diverse but really closely related species. These strange groups have probably in each case been derived from some single ancestor which has strayed into the islands in the remote past.

More difficult is the origin and probable relationship of this ancestral Agrionine. A study of the penes in the species listed by Kirby as *Coenagrion* shows that the extra-Hawaiian forms fall into at least two groups, the group of which *puella* is the type (see figs. 39, 46-49) and the group of which *lindenii* is the type (see figs. 40-45). As *lindenii* has been given generic rank by Navas† as *Cercion lindenii*, probably *Cercion* can be

*Ann. and Mag. Nat. Hist. (5), Vol. 12, p. 237.

†Broteria 6, p. 55, 1907.

applied to the other three species figured as having penes similar to that of *lindenii*. I have so used it, though I should have compared these species in other characters had I had time. A good series of intermediate forms exists in the genus *Coenagrion* between the *puella* penis and such penes as are shown in figs. 46-49.

Of the two groups represented by *lindenii* and *puella* respectively, the penes would seem to indicate relationship of the Hawaiian Megalagrions with *Cercion* rather than with *Coenagrion* of the *puella* group. This agrees with McLachlan's observation* that the Hawaiian forms seemed more like *lindenii* than any of the other Eurasian species. As the American Coenagrions have penes which are aberrant forms of the *puella* type, this agrees with what is thought concerning the origin of the other peculiar Hawaiian genera: that these are not North American in origin.

My first paper showed that too much dependence cannot be put on penile characters alone, nevertheless a study of these in this case has thrown an interesting side light on this Hawaiian problem.

EXPLANATION OF PLATES II AND III.

Drawings of the penes of *Megalagrion*, *Cercion* and *Coenagrion*, being ventral and lateral views of the last two segments.

Figs. 1-2. *Megalagrion pacificum* (McLachlan). Northwest Koolau Range, Oahu, Hawaiian Islands; 1500 ft. elevation. April, 1901. R. C. L. Perkins coll.

Figs. 3-4. *Megalagrion xanthomelas* (Selys). Honolulu, Oahu, Hawaiian Islands. Nov., 1900. R. C. L. Perkins coll.

Figs. 5-6. *Megalagrion leptodemas* (Perkins). Northwest Koolau Range, Oahu, Hawaiian Islands; 1800 ft. elevation. April, 1901. R. C. L. Perkins coll.

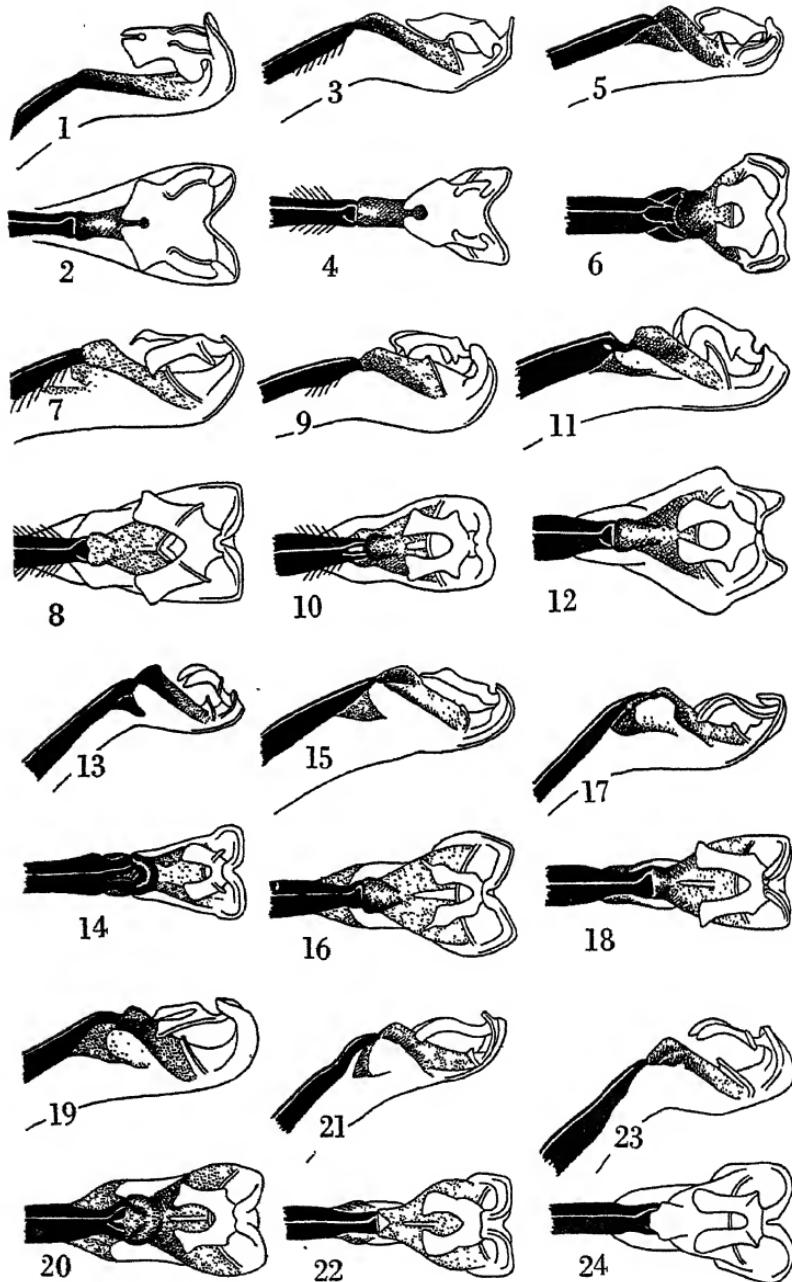
Figs. 7-8. *Megalagrion amauropyrum* var. *peles* (Perkins). Hawaii, Hawaiian Islands, 1901. Koebele coll.

Figs. 9-10. *Megalagrion calliphya* (McLachlan). Iao Valley, Maui, Hawaiian Islands. 1902. R. C. L. Perkins coll.

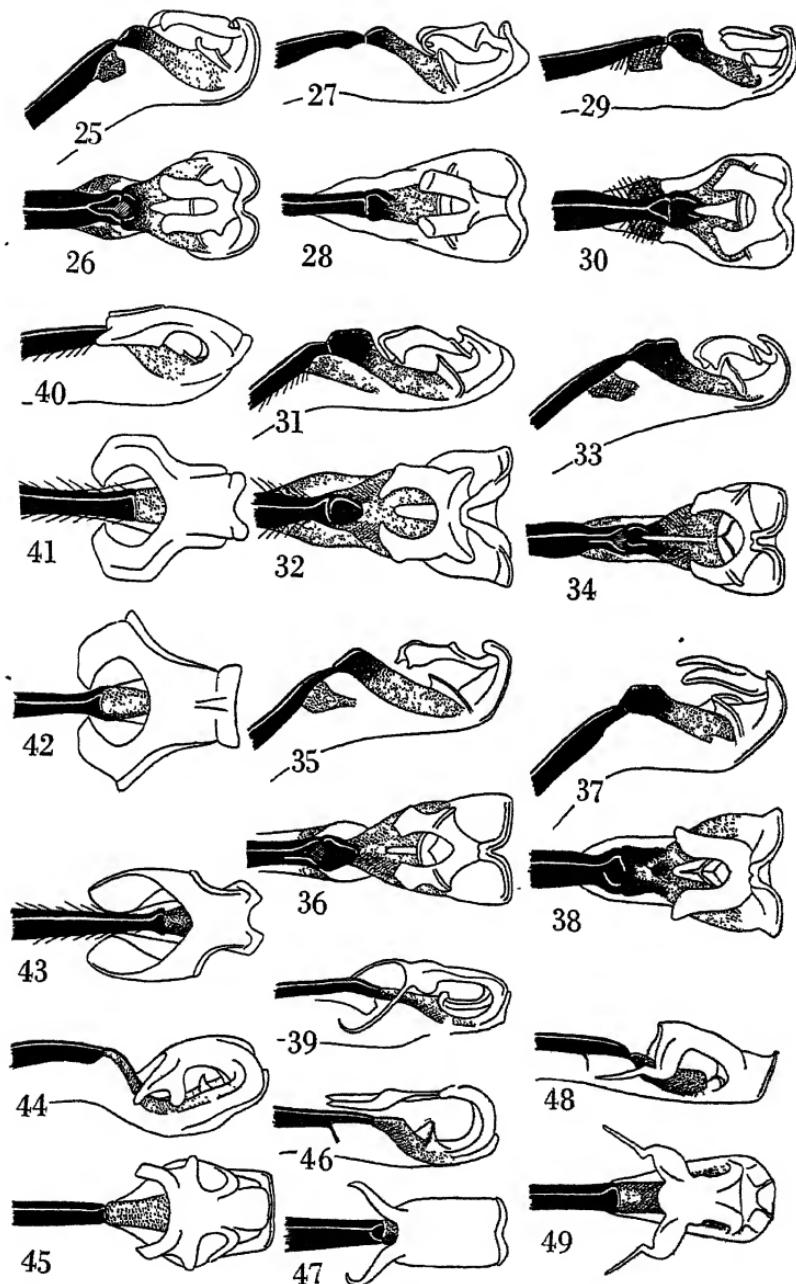
Figs. 11-12. *Megalagrion calliphya* var. *microdemas* Kilauea, Hawaii, Hawaiian Islands. July, 1903. R. C. L. Perkins coll.

Figs. 13-14. *Megalagrion eudytum* (Perkins). Lihue, Kauai, Hawaiian Islands; 1000 + ft. elevation. R. C. L. Perkins coll.

* Ann. and Mag. Nat. Hist. (5), Vol. 12, p. 240.



PENES OF HAWAIIAN AGRIONINAE.—KENNEDY.



PENES OF HAWAIIAN AGRIONINAE.—KENNEDY.

- Figs. 15-16. *Megalagrion deceptor* (McLachlan). Oahu, Hawaiian Islands. Koebele coll.*
- Figs. 17-18. *Megalagrion blackburni* McLachlan. Halealau, Hawaiian Islands. June, 1903. R. C. L. Perkins coll.
- Figs. 19-20. *Megalagrion oceanicum* McLachlan. Northwest Koolau Range, Oahu, Hawaiian Islands; 1500 ft. elevation. April, 1901. R. C. L. Perkins coll.
- Figs. 21-22. *Megalagrion heterogamias* (Perkins). Makaweli, Kauai, Hawaiian Islands; 2000 ft. elevation. Feb., 1897. R. C. L. Perkins coll.
- Figs. 23-24. *Megalagrion vagabundum* (Perkins). Lihue, Kauai, Hawaiian Islands. R. C. L. Perkins coll.
- Figs. 25-26. *Megalagrion oahuense* (Blackburn). Northwest Koolau Range, Oahu, Hawaiian Islands; 1500 ft. elevation. R. C. L. Perkins coll.
- Figs. 27-28. *Megalagrion koelense* (Blackburn). Honolulu Mts., Hawaiian Islands; 1800 ft. elevation. Dec., 1901. R. C. L. Perkins coll.
- Figs. 29-30. *Megalagrion asteliae* (Perkins). Honolulu Mts., Oahu, Hawaiian Islands, 2000 ft. elevation. July, 1900. R. C. L. Perkins coll.
- Figs. 31-32. *Megalagrion nigrohamatum* (Blackburn). West Maui Mts., Maui, Hawaiian Islands. Oct., 1896. R. C. L. Perkins coll.
- Figs. 33-34. *Megalagrion nigrohamatum* var. *nigrolineatum* (Perkins). Northwest Koolau Range, Oahu, Hawaiian Islands; 1500 ft. elevation. R. C. L. Perkins coll.
- Figs. 35-36. *Megalagrion hawaiiense* (McLachlan). Palolo Valley, Oahu, Hawaiian Islands. May, 1912. R. C. L. Perkins coll.
- Figs. 37-38. *Megalagrion nesiotcs* (Perkins). Kilauea, Hawaii, Hawaiian Islands. July, 1903. R. C. L. Perkins coll.
- Fig. 39. *Coenagrion puella* (Linn.). From male in coll. of E. B. Williamson. No data except July 27, 1907.

[* The specimen from which this drawing was made is not typical *deceptor*, but differs in having the inferior appendages almost as long as the superiors, more strongly curved dorsad in the apical half so that the upper margin of the inferiors is almost a (concave) semi-circle. The dilated part of the superiors is not as much as half the length of the appendages and is a little higher, proportionally and relatively, than in other specimens. There are four, not five, antenodal cells and less black on the body generally than called for by McLachlan's description. These color and venational differences may be but individual variations, judging from other Hawaiian species, but whether the differences above mentioned for the appendages are explicable in the same way, I am unable to decide, having too few specimens.—P. P. CALVERT.]

- Figs. 40-41. *Cercion lindenii* (Selys). From male in coll. of E. B. Williamson. "K. J. Morton coll., May 1, 1912."
- Fig. 42. *Cercion quadrigerum* (Selys). From male in coll. of Dr. P. P. Calvert. Only datum is "Japan."
- Fig. 43. *Cercion* sp. From male in coll. of Dr. P. P. Calvert. "Japan, Chic. Exhib. No. 1397."
- Figs. 44-45. *Cercion* (?) sp. From male, with damaged abdominal appendages, in coll. of Dr. P. P. Calvert. "Madagascar. From René Martin."
- Figs. 46-47. *Coenagrion angulatum* Walker. From a male in coll. of E. B. Williamson. Coll. and det. by Dr. E. M. Walker.
- Figs. 48-49. *Coenagrion caerulescens* (Fonsc.). From male in coll. of E. B. Williamson. "From K. J. Morton. Sebdon, Algeria, June 23, 1904."

A Simple Method of Identifying the *Anopheles* Mosquitoes of the Canal Zone (Dip.).*

By L. H. DUNN, Entomologist, Board of Health Laboratory,
Ancon, Panama Canal Zone.

The purpose of this article is to endeavor to supply a long-felt want and present a simple method of identifying the more common types of *Anopheles* mosquitoes found in the Canal Zone, and it is to be hoped that it may prove to be useful to those for whom it is intended, sanitary inspectors, medical men, and others interested in sanitary work.

The anti-malarial work on the Canal Zone is of sufficient importance to make it necessary that all those engaged in sanitary work should be able to identify the *Anopheles* commonly encountered, and especially should be able to differentiate those that are known to be malarial carriers from those that are not.

Each species of the Zone *Anopheles* has some characteristic markings peculiar to itself that make it easy to identify when they are once known, and provided the specimens are not too badly mutilated. Mosquitoes that have been in flight for some time before capture, or have been bred out from larvae and left in a breeding jar for several days before an attempt at

*Read before The Medical Association of the Isthmian Canal Zone, September 16, 1916.

identification is made, are often broken and rubbed sufficiently to remove many of the scales, and to lose some of the color markings that help to simplify identification, and are more difficult to identify.

As far as I have been able to ascertain eleven species of *Anopheles* have been found in the Canal Zone up to the present time. Seven of these species are commonly found in this region. The remaining four species are seldom encountered. The seven common kinds are placed in the following list according to their abundance on the Canal Zone at the present time: *Anopheles albimanus* Wiedemann, *tarsimaculata* Goeldi, *pseudopunctipennis* Theobald, *malefactor* Dyar & Knab, *argyritarsis* Desvoidy, *apicimacula* Dyar & Knab, *eiseni* Coquillett.

The four species not commonly found are: *Anopheles gorgasi* Dyar & Knab, *crusii* Dyar & Knab, *punctimacula* Dyar & Knab, *franciscanus* McCracken.

Seasonal changes exert an influence on the abundance of the different species and the relative numbers of the *Anopheles* at certain periods of the year may not conform with this list, but it has been taken from the average for the whole year, from both the larvae received at the Laboratory for identification, and from the hand catches of adults in quarters that are sent in daily, from all towns and army posts in the Zone, to be identified. For example, *A. eiseni* that nearly always breeds in tree-holes and hollows in rocks and other places of like nature, is few in numbers even during the middle of the rainy season, but may not be found even in what seem to be its favorite localities even after a long search during the latter part of a dry season when very little rain has fallen and its habitual breeding places are dried up.

I have attempted to construct the following table in such a manner that it provides a simple method for determining the adult *Anopheles* found in the Canal Zone, and as far as possible have avoided all entomological nomenclature so that it may be readily understood by those who are not familiar with the anatomy of mosquitoes.

*Table for the identification of the common species of Canal Zone
Anopheles.*

- | | |
|--|------------------------------|
| 1—Hind legs with white feet..... | 2 |
| Hind legs long and dark colored without white feet or white markings | <i>A. pseudopunctipennis</i> |
| Hind legs without white feet, but with white band at middle of leg (white knee)..... | <i>A. eiseni</i> |
| Hind legs without white feet but with all three pairs of legs covered with white spots and narrow white bands (having a freckled appearance) | 3 |
| 2—White feet with a narrow black band near the end..... | 4 |
| White feet without a narrow black band near the end, | |
| | <i>A. argyritarsis</i> |
| 3—With black spot, or patch of black scales, at extreme, or apical, end of wing | <i>A. apicimacula</i> |
| Without a black spot, or patch of black scales, at extreme, or apical, end of wing | <i>A. malefactor</i> |
| 4—Female with tip, or apical end, of palpi white, separated from a narrow white band by a wide black band. The separating black band is more than twice as wide as either the white tip or the proximal white band | <i>A. albimanus</i> |
| Female with tip, or apical end, of palpi white, separated from a wide white band by a narrow black band. The separating black band is less than half as wide as either the white tip or the proximal white band | <i>A. tarsimaculata</i> |

But one specimen of *A. gorgasi* has been found on the Isthmus so far, and during the five years that I have been at the Laboratory I have not received any specimens of either *A. punctimacula* or *A. crusii* in either the larval or adult forms. *A. franciscanus* is so few in numbers that it is practically nil, therefore owing to the fact that these four species are so seldom encountered I have not included them in the foregoing table, as doing so would only make the table more difficult for a beginner to understand, and in this case not increase its value for practical work.

Anopheles pseudopunctipennis.

A few words of explanation may serve to assist in verifying the identifications of the different species as made by this table. Beginning with *A. pseudopunctipennis*, which is about the easiest to identify, it can be seen that it is the largest of the seven species of *Anopheles*, and has very long legs. All

the legs are used to support the body while at rest, with all feet on the resting surface. This species is easily identified by the long hind legs devoid of any white spots or bands, and without white feet. Each joint has a small yellow spot at its union with the following joint, and these spots should not be mistaken for white bands. Another identifying mark of this species is a light gray stripe on the back, or thorax, extending from the head to the abdomen. This begins as a very narrow stripe between the eyes and widens as it extends backwards until the posterior end becomes nearly as wide as the thorax. The palpi are dark brown with two narrow bands and tip of light yellow. The light-colored tip is separated from the proximal light band by a dark band about as wide as the light tip. The palpi somewhat resemble those of *A. albimanus* in the arrangement of the bands, but there is a difference in their width and *A. pseudopunctipennis* has light yellow bands while *A. albimanus* has white. The principal features of *A. pseudopunctipennis* are that there are no white markings on the legs, and none of the feet are white.

Anopheles eiseni.

The next species to be easily identified is *A. eiseni*. It is smaller than *A. pseudopunctipennis* and can be differentiated from that species by having a white band near the middle of each hind leg. The feet and middle pair of legs are dark with no white markings. The single broad white band on each hind leg and dark feet makes this mosquito easily separated from all the other species having white feet or spotted legs. The wing borders of this species are dark-colored except for two white spots at the tip, or apex, of the wing. The palpi are dark except for the apical third, which consists of two white bands, or rather one white band and a white tip, separated from each other by a narrow black band one half as wide as either of the white ones.

Anopheles malefactor et apicimacula.

The next group in order of simplicity of identification is composed of those whose legs are covered with narrow white bands and small white spots and have the appearance of being

covered with white freckles. This speckled-legged group consists of two species, *A. malefactor* and *A. apicimacula*, and can be easily separated from the other five species of common *Anopheles* of the Canal Zone by their speckled legs. Both of these mosquitoes are quite pretty and are almost identical in appearance and can only be separated from one another by the wing markings. *A. apicimacula* has a large black spot, or patch of black scales, at the upper portion of the tip, or apex, of the wings, and this deep black spot easily separates this species from *A. malefactor*, which does not have this deep black spot but has a few small scattered groups of black spots taking its place. There is also a difference in the arrangement of the black and white spots along the veins of the wings, but to anyone not accustomed to identifying mosquitoes this diversity may not be readily noticeable, and the difference between the decoration on the tip of the wing is the best means of separating the two species: the large black spot in *A. apicimacula* and the few small scattered groups of black spots in *A. malefactor*. It is rather difficult to distinguish between these two species when the specimens are very badly rubbed and many of the wing scales removed.

Anopheles argyritarsis, albimanus et tarsimaculata.

The next and last and most important group from a medical standpoint is the white-footed group which consists of three species, *A. argyritarsis*, *A. albimanus*, and *A. tarsimaculata*. These three mosquitoes are readily separated from the other four common *Anopheles* by the fact that each of these three species has white feet on the hind legs. *A. argyritarsis* can be readily distinguished from the other two species by its hind feet which are snow white without any narrow black band near the end. The palpi of *A. argyritarsis* and *A. albimanus* are very similar. *A. albimanus* and *A. tarsimaculata* both have white hind feet, but in both species there is a narrow black band near the end. This black band is separated from the apical end of the feet by a narrow white band of nearly the same width as the black band. The similarity of the feet markings in these two mosquitoes makes it necessary

to separate the two species by the markings on the palpi. As shown in the foregoing table the difference between the markings of the palpi is in the arrangement of the black and white bands. The white markings of *A. albimanus* can be plainly seen with a small lens and they consist of a white tip, or apex, and two narrow white bands. The white tip is separated from the nearer white band by a wide black band more than twice as wide as either the white band or tip. This nearer white band is separated from the second white band by another black band about as wide as the first black band. In *A. tarsimaculata* the palpi have a wide white tip and one wide white band and another narrower one. The wide white tip is separated from the nearer wide white band by a narrow black band less than half as wide as either the wide white band or tip. This nearer wide white band is separated from the second white band, which is a narrow one, by a wide black band much wider than the wide white band.

These two species seem to be very closely related to each other and the only practical difference between them is in the arrangement of the bands on the proboscis. Some specimens when caught as adults may have the proboscis so badly rubbed that they may be almost entirely denuded of scales. These are very difficult to identify as it is the scales of different colors that give the color markings on the proboscis, but the difference in fresh specimens can be so readily seen that a glance at the proboscis is all that is required to separate the two species.

All of the markings that I have described are so distinctive and well-defined on fresh unrubbed females that they are obvious to an untrained observer, and after they have been seen a few times are easily remembered. The best plan for a beginner is to acquire experience by identifying bred out specimens before starting on those that have been caught in flight.

This method of identification only pertains to the seven common species and does not provide for the classification of the uncommon species or for any new species that may make their appearance in the Canal Zone. These encounters are liable to occur but seldom if at all. After a little experience one becomes so familiar with the markings of the common types that any new varieties can easily be detected.

New Chalcid Flies from Maryland (Hym.).

By A. A. GIRAULT, Glenndale, Maryland.

CARLYLEIA new genus.

Female :—Like *Parasecodella* Girault but the marginal vein is somewhat longer than the submarginal, the postmarginal and stigmal veins are nearly equal, distinct, moderately long, the former a little longer, the stigmal with a distinct neck and ovate club; the antennae are inserted a little below the eyes, near the mouth-border and the club is solid and scarcely wider than the funicle; the distinct propodeum is noncarinate (of uniform length or nearly so, its minute spiracle about central, or a little caudad of middle); the abdomen bears a very short petiole, is pointed conic-ovate, produced beneath, longer than the thorax, excluding the ovipositor which is extruded for a third of the abdomen's length.

Otherwise the same but the mandibles bidentate. Parapsidal furrows complete, distinct. Axillae scarcely advanced. Caudal tibial spur single. Marginal cilia of fore wing a little longer than normal (that is, not extremely short). Body slender. Coxae large. Prothorax conical.

This group is somewhat anomalous but because of its habitus, noncarinated propodeum, venation and the ciliation of the fore wing and the paucity of teeth in the mandibles, I think it is correctly placed among the Omphalini. The submarginal vein is distinctly broken.

Carlyleia marilandica new species. Genotype.

♀. Length, 1.00 mm., excluding the ovipositor. Metallic blue green, the fore wings lightly infuscated throughout except for a more or less obscure, clear space across from the break of the submarginal vein; legs white except all of cephalic coxa and femur and the middle and caudal femora (except at each end). Antennae black, the scape yellowish white except above at apex. First ring joint smallest; funicle 1 somewhat longer than wide, slightly shorter than the pedicel, 4 quadrate; club without a terminal nipple, about three-fourths the length of the funicle. Head subglabrous. Thorax very densely scaly, the scutellum smoother. Scutum with scattered, prostrate setae, the scutellum with not more than four.

Described from one female captured in the woods, May, 1916 (Glenndale, Maryland).

Type:—Catalogue No. 20296, United States National Museum, the female on a tag, the head and a caudal leg on a slide.

Aprostocetus marilandicus new species.

♀. The same as *whitmani* but a third smaller, the antennae are wholly white except the bulla and proximal third each of the scape and pedicel, the third club joint dusky at apex; otherwise the same. Types compared.

Described from two females from the woods, Glenndale, Prince George County, Maryland, April.

Types: Catalogue No. 20300, U. S. N. M., the two females together on a tag, their heads on a slide.

This new species is like *Neomphaloïdella semilongifasciata* and *N. pulchriventris* of North America, purple species with a more or less yellow abdomen, margined with purple, the legs with the dark color more abundant from caudad to cephalad, thus similar to a number of Australian species of Tetrastichini and Eupelminae.

Chrysocharomyia eleganta new species.

♀. Length, 1.30 mm. Abdomen conic-ovate, somewhat longer than the thorax.

Dark metallic blue, the legs and antennae concolorous except knees, tips of tibiae, cephalic tibiae except for two obscure cincti, one near knee, the other at the middle, three proximal tarsal joints and the scape except above at apex. Venter of abdomen suffused with yellowish.

Mandibles acutely tridentate but the ventral side of the third tooth denticulate. Ring joints subequal. Pedicel a third longer than wide at apex, shorter than any following joint by far; funicle 1 longest of the flagellum, two and one-quarter times longer than wide, slightly longer than club 2; funicles 2 to 3 subequal, each nearly twice longer than wide or 3 subequal to club 1 and a little shorter than 2; terminal spine of club distinct, not half the length of its joint.

Fore wings with a nearly complete smoky* fascia across from the stigmal knob and which fades caudad of middle, and with a small round smoky spot against the marginal vein a short distance proximad of its middle. Marginal vein elongate, the postmarginal distinctly longer than the stigmal, the latter with a short neck and an ovate club. Marginal fringes of the fore wing distinct, short.

Body densely scaly, the scutellum with a seta on each side before apex, the propodeum only with a delicate carina laterad of the spiracle. Parapsidal furrows complete but sutured cephalad only.

One female, Glenndale, Maryland, from the woods, June 24, 1916.

—*Type*: Catalogue No. 20356, U. S. N. M., the female on a tag, a wing, caudal tibia and the head on a slide.

Achrysocharis divina new species.

Female :—Length, 0.75 mm. Differs from the genotype in having the scape moderately convexly dilated ventrad, plainly compressed.

Metallic green and densely scaly punctate; legs and antennae white except the coxae, middle femur at base, middle tibia just below the knee, caudal femora and tibiae, pedicel except at apex beneath, funicle 1, apex of funicle 2, clubs 2 and 3, and the blotched scape which is metallic at proximal third of ventral margin and at distal third (or the apex broadly). Head pale yellow excepting the occiput (except narrowly across at vertex), a broken metallic line across face just above the antennae and a second convexed and broken line through the antennae; also a more or less distinct spot near the eye on upper face, minute setae (few) of vertex from dusky dots.

Fore wings distinctly bifasciate, the first fascia from the apex of the marginal vein along the mesal side of the stigmal, flat-bow-shaped and fading toward the caudal margin, the second nearly straight but with wavy margins, across near apex (at middle, about its own width from apex). Marginal fringes of fore wing between a fifth and a sixth of the greatest wing width, the stigmal vein slightly longer than the postmarginal.

Cheeks moderately long, the mandibles 4-dentate. Flagellum clothed with scraggy hairs; funicle 1 a little longer than the oval pedicel, sub-equal to 2, the club joints a little more slender, the terminal nipple distinct, not as long as the joint bearing it. Parapsidal furrows distinct, complete.

One female, June 14, 1916, from a field of weeds, Prince George County, Maryland.

Type: Catalogue No. 20320, U. S. N. M., the female on a slide.

SPALANGIOLAEAPS new genus.

Nearly related to *Apterolaelaps* Girault but differs as follows: There is no arcuate carina on the face ventrad of the antennae, the carina separating the scrobes is at ventral third

only, the mandibles are 4-dentate, there is no cross-suture on the scutellum, the neck of the propodeum is more distinct while the abdomen is subsessile, the petiole transverse-linear. Moreover, the antennae are 13-jointed with one ring-joint, the club 3-jointed. Maxillary palpi 4-jointed. Pronotum quadrate.

Spalangiolaelaps argenticoxa new species. Genotype.

♀. Length, 2.50 mm. Honey yellow, the coxae silvery-white, the caudal tibiae fuscous, the apex of the abdomen, a spot between the tegula and the axilla, a large area dorso-laterad just before middle of segment 2 of the abdomen (fuscous), caudal margin of that segment broadly, pedicel and rest of flagellum, save funicles 1 to 2, black.

Head densely scaly-punctate, the lower face convergently striate. Pedicel nearly thrice longer than wide, distinctly shorter than funicle 1, the latter subelongate, thicker distad or subclavate, four times longer than wide, a third longer than 2, 6 quadrate, 7 subquadrate.

Thorax cross-reticulated scaly, the scutellum and axillae finely long-striate. Four long black bristles across pronotum caudad, two on caudal scutum, one on the axilla laterad, four on the scutellum at the middle, arranged in a semi-circle; long black setae on the vertex (8). Propodeum between the spiracles long-striate, the spiracle round, central. Parapsidal furrows as in *Uriolaelaps* yet touching the scutellum.

Fore wings about twice the size of the posterior wings, both small, longer than wide.

Abdomen delicately scaly, distad of segment 2.

From one female, Hillmead (Glenndale), Prince George County, Maryland. Captured by sweeping the foliage of oaks and other trees of various species in the woods, June 4, 1916.

Type: Catalogue No. 20305, U. S. N. M., the female on a tag, the head and a caudal tibia on a slide.

Miscogaster unguitta new species.

♀. Similar to *flora* but somewhat smaller and the middle tibiae also are metallic purple. Also, the short abdominal petiole is white. Otherwise the same. Mandibles 4-dentate.

One female, Glenndale, Maryland, from the woods, June 4, 1916.

Type: Catalogue No. 20313, U. S. N. M., the female on a tag, the head and caudal tibiae on a slide.

Some Unusual Orchid Insects (Hem., Lep., Dip., Col.).

By HARRY B. WEISS, New Brunswick, New Jersey.

(Plates IV and V.)

The following notes relate only to unusual insects which have been found associated with orchids growing in New Jersey greenhouses. Biological information concerning such species accumulates slowly, especially when one is forced to study them in greenhouses, where material as a rule is exceedingly scarce and the plants too valuable for unlimited experimentation.

Two of the species mentioned herein are new, having only recently been described by Mr. G. C. Champion, in the *Entomologist's Monthly Magazine* for September, 1916, page 200. These are the weevils *Cholus cattleyae* and *Diorymellus laevimargo*. Inasmuch as the above mentioned publication is readily accessible to entomologists in America, it was not thought necessary to reprint the descriptions which Mr. Champion so kindly drew up at my request.

Tenthecoris bicolor Scott (Hemip.).

This blue and red member of the family *Miridae* is occasionally met with in New Jersey greenhouses where orchids are grown and has been taken at various times by inspectors examining orchids from South America. It is a common occurrence to find the leaves of *Cattleya* orchids imported from Brazil covered with irregular, white spots one or two millimetres in size, due to the abstraction of chlorophyll by this bug. (Plate IV, fig. 3). As a rule it is never abundant enough in greenhouses to do much damage, although it has been known in the past to occur in numbers sufficient to seriously weaken and disfigure the orchids. It is incorrectly known to many orchid growers as the "Brazilian thrips."

The adult lives underneath the leaves of infested plants and both the nymphs and adults puncture the leaves and suck the juices. *Cattleyas* are especially subject to attack and *Laelias* and *Sophronitis* often show the characteristic spotting of the leaves. The following brief description from an account in

the *Gardeners' Chronicle* for May 16, 1908, p. 313, by Mr. F. Denis, will enable one to identify this species.

Tenthecoris bicolor Scott 1886, synonym *Euritotarsus orchidearum* Reuter 1902.

Head, pronotum and external edge of upper wings of a pronounced brick red color; thorax and rest of upper wings, bright blue; antennae and legs, yellow; upper side of body and antennae covered with fine short hairs; head conical in front with well developed eyes; antennae more than half as long as the body. Pronotum constricted, with a deep ridge in the centre of the constriction. The under part of the body is of a reddish-yellow. The length excluding antennae, 4 mm., the breadth rather less than 2 mm.

Castnia therapon Koll. (Lep.).

This is a rare insect in orchid houses occurring only in a very limited way. The large, pinkish white larva of this species bores through the rhizome and up into the bulb, doing, of course, considerable damage. *Oncidium crispum*, *Cattleya labiata* and *Catasctum* spp. are the recorded food plants. Brief mention is made of this species together with a figure of the adult in Seitz's *Macrolepidoptera of the World*, vol. VI, p. 12, plate 7, a, which gives Brazil as its native home. It is undoubtedly imported every year or so in orchids from Brazil and never becomes permanently established in the orchid house, as the adult is too large and showy to escape attention.

Parallelodiplosis cattleyae Moll. (Dip.).

This species known as the *Cattleya* midge is another rather rare insect. The larval stages are passed as yellowish-white maggots near the tips of the roots resulting in unsightly swellings, which disfigure the roots and check growth, sometimes causing them to turn black and die. According to Dr. E. P. Felt, who gives a brief account of this species in the *N. Y. State Museum Bulletin* 180, p. 89, each gall may contain from one to seven maggots, each in a cavity by itself. Orchids imported from Guatemala often have the roots badly disfigured by these swellings. (Plate IV, fig. 1).

Eucactophagus graphipterus Champ. (Col.). (Plate V, fig. 1.)

This interesting and large member of the family *Calandridae* is a native of Costa Rica and the U. S. of Colombia. It

feeds chiefly on such plants as *Oncidium oblongatum*, *Lycaste*, *Odontoglossum* and various other species having large soft pseudo-bulbs. The adult, which is about 17 mm. long and 7 mm. wide and characteristically marked, gnaws large irregular depressions in the pseudo-bulbs and also feeds on the bases of the leaves, usually cutting them off more or less completely. (Plate IV, fig. 4.) Sometimes they feed rather openly on the leaves, but as a rule they can be found lurking at the base of the plant. The larva lives in the pseudo-bulb and excavates quite a large cavity, destroying much of the interior and paving the way for decay. Pupation also takes place in the pseudo-bulb. The body of the adult is quite hard, it being almost impossible to pierce it with an ordinary pin unless considerable force is exerted. That they can endure long fasts is evident from the treatment, which they sometimes receive at the hands of unfeeling workmen in orchid houses, who tie strings to their legs and hang them up for weeks at a time finally taking them down and killing them in disgust because they persist in remaining alive.

Acypotheus (Baridius) orchivora Blackb. (Col.). (Plate V, fig. 3.)

It is not unusual to come across this representative of the family Baridae and indications of its work in *Dendrobium* orchids growing in various greenhouses in northern New Jersey. It is a typical, little, dull black weevil about 3.5 mm. long, having the snout and legs thickened, the thorax wider than long and rounded on the sides to the hind margin. The elytron is convex and broadly rounded to the apex. The head is finely punctured, the thoracic dorsum more coarsely pitted and the elytra marked with parallel punctured striae, the ventral surface and legs also being finely pitted. It was described by the Rev. T. Blackburn in the *Transactions of the Royal Society of South Australia*, 1900. Mr. Walter W. Froggatt in Misc. Pub. No. 751 from the *Agricultural Gazette of N. S. Wales* gives a brief account of this species and figures an adult. He states that the insects were bred from the pseudo-bulbs or thickened leaf stalks of *Dendrobium canaliculatum* and gives the following descriptions of the larva and pupa.

Larva—short, thickened, wrinkled and curled in burrow when at rest; head chestnut brown, lightest in center where it is bisected by two darker lines, arcuate on hind margin; jaws black, antennae and palpi reddish brown.

Pupa—Pale yellow with black eyes; tip of snout and spines on abdomen reddish brown, wing-pads dark colored at tips; dorsal surface of head smooth, bearing a few scattered hairs; thorax broad showing a depression on either side and a central suture; abdomen tapering to extremity, each segment furnished with a spine on either side with anal one bearing two and a number of spiny hairs at apex; surface shows several fine hairs upon head with two longer ones above eyes; snout and legs curled downward, wings folded down forming a pad on either side.

This insect was evidently introduced into New Jersey greenhouses in orchids imported from some tropical country of the Eastern hemisphere and while it is not by any means common, it is not unusual to collect a specimen or two by diligently hunting through a house of Dendrobiums. During the middle of the day the beetles seem to prefer to rest in the curled, basal portion of the leaf, where a considerable part of their feeding takes place. In New Jersey, *Dendrobium findlayanum* and *D. crystallinum* seem to be attacked more than other species as I have found entire specimens of these plants completely riddled by the larvae.

Diorymellus laevimargo Champ. (Col.). (Plate V, fig. 4.)

This little, black, shiny fellow, which is only 2 mm. long and 1 mm. wide and also a member of the *Baridae*, is sometimes excessively abundant in orchid houses feeding on Cattleyas and Dendrobiums. *Cattleya mossiae* and *C. speciosissima* have been the ones particularly subject to attack. In addition to feeding on the leaves, pseudo-bulbs and flower stalks, the orchid-growers credit this beetle with doing considerable damage to the flowers and unopened flower buds. Plate IV, figure 2 shows the somewhat hard discolorations and spots, usually at the tips and edges of the petals and sepals, which surround the feeding punctures. I have been informed that a somewhat similar-looking injury follows improper ventilation and watering. Such markings of course make the flowers unsalable or reduce their value. The beetles can be found, some-

times crawling slowly over the plants, but usually in the curled up, basal part of the leaf or in the sheath surrounding the flower stalk. Advantage is taken of this habit by the orchid-grower who sometimes sends a man daily through the house to hunt out and destroy them. Up to the present I have been unsuccessful in my search for larvae and pupae and know nothing concerning the early stages. Mr. G. C. Champion writes that the eight known species of *Diorymellus* are all from Central America and that this new species is related to *D. octostriatus* and *D. 12-striatus*.

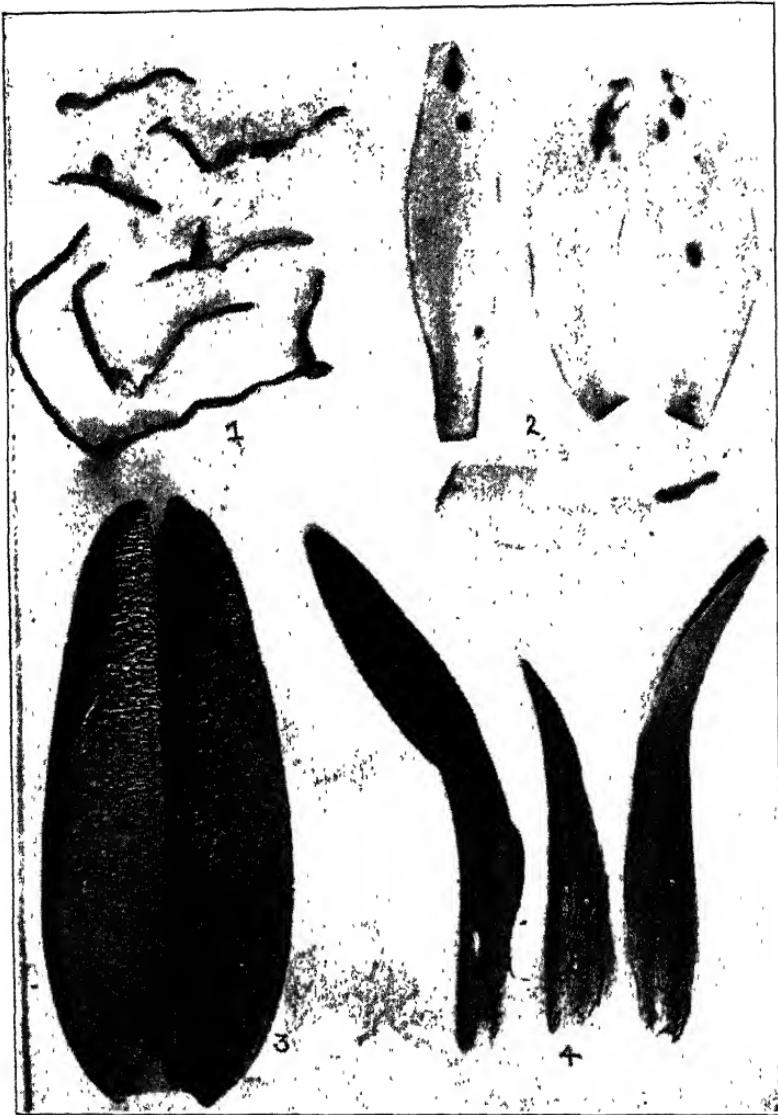
***Cholus cattleyae* Champ. (Col.). (Plate V, fig. 2.)**

This attractive species, which belongs to the *Curculionidae*, is about 11 mm. long, 5 mm. wide, black and characteristically marked with white and has been found as a rule associated only with *Cattleya gigas*, but other species are sometimes injured. Its feeding habits are somewhat similar to those of *Eucactophagus graphipterus* except that the damage is done higher up. The surface of the pseudo-bulb is irregularly chewed and the leaves punctured with large holes, the tissue surrounding these punctures finally turning black and becoming hard and dead. From information received from orchid-growers and my own observations, I am inclined to believe that the larval and pupal stages are passed within the pseudo-bulbs, as coleopterous larvae have been taken from these bulbs and they often contain large cavities and exit holes. Mr. Champion states that this species is allied to *C. forbesi* Pasc., from Ecuador, found among orchids and that two allied forms occur in Central America, these being *C. nigromaculatus* and *C. nigronotatus*. *Cattleya gigas* comes from Colombia which is undoubtedly the home of this species.*

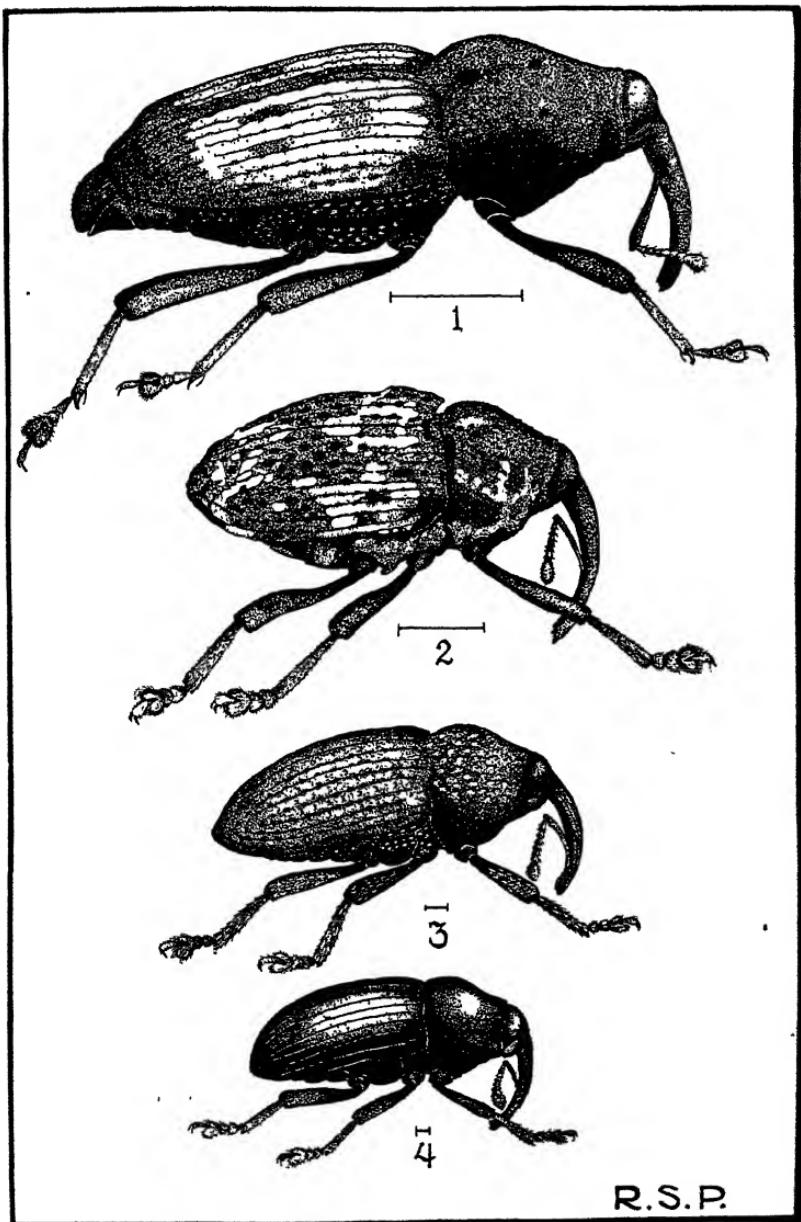
***Diazenes dendrobii* Gahan (Col.).**

This species, known as the *Dendrobium* orchid beetle, at-

*Since the above was written, Mr. H. S. Barber has examined my specimens and finds that two species are confused. One is *Cholus cattleyae* and the other has been identified tentatively by him as *Cholus forbesii* Pascoe. In view of this, the notes under *Cholus cattleyae* apply equally well to ? *Cholus forbesii* as both were found together.



UNUSUAL ORCHID INSECTS.—WEISS.



R.S.P.

tacks Dendrobiums, Cattleyas and Laelias. The larvae feed in the tissue of the pseudo-bulb and sometimes mine it so completely that only the outer skin is left, while the beetles attack the foliage, pseudo-bulbs and roots. All stages, together with injured orchids, are figured in the *Gardeners' Chronicle* for July 24, 1897, by R. Stewart MacDougall. In the same article, an allied species, *Diarenes taylori*, is also mentioned. As far as I know neither of these species has been found in New Jersey.

EXPLANATION OF PLATES.

PLATE IV.

- Fig. 1—Galls of *Paralellodiplosis cattleyae* on orchid roots.
Fig. 2—Sepals of *Cattleya mossiae* injured by *Diorymellus laevimargo* Champ.
Fig. 3—Leaf of *Cattleya* sp., showing discoloration due to feeding of *Tenthecoris bicolor*.
Fig. 4—Leaves of *Oncidium oblongatum* eaten at bases by *Eucactophagus graphipterus*.

PLATE V.

- Fig. 1—*Eucactophagus graphipterus* Champ.
Fig. 2—*Cholus cattleyae* Champ.
Fig. 3—*Acypothecus orchivora* Blackb.
Fig. 4—*Diorymellus laevimargo* Champ.
-

The Distribution and Synonymy of *Autographa vaccinii* Hy. Edw. (Lep.).

By RODRIGUES OTTOLENGUI, New York City.

By way of a foreword I desire to state that after a lapse of fourteen years I am once more engaged in a study of *Autographa* and Allied Genera (see Journal New York Entomological Society, June, 1902). I hope in the near future to publish another monograph, this time illustrated with colored plates. To this end I already have colored drawings of all North American types in the British Museum, obtained through the courteous co-operation of Sir George Hampson. Also, about thirty colored drawings from my own material have thus far been completed by that wonderfully accurate

artist, Mrs. Wm. Beutenmuller, who is at work on the other North American species.

I would much appreciate the assistance and co-operation of American collectors and museum curators, not only in supplying specimens (for which I will gladly pay liberally in cash or exchange), but for information as well. The first information requested is in regard to *vaccinii*. If any collector or museum is in possession of this species, taken elsewhere than above timber line on Mt. Washington or neighboring peaks, I would give much for the privilege of examining the same.

In using the term *Autographa* as the generic name I am not at present denying Sir George Hampson's substituted term *Syngrapha*. I am simply using the term at present familiar to American collectors.

Autographa vaccinii was described by Harry Edwards (*Entomologica Americana*, Vol. II, p. 170, 1886). It was discovered by Mr. Roland Thaxter on Mt. Washington, and he also found and reared the larva on a species of *Vaccinium*, whence the name. In his description Edwards points out the similarities and difference between his new species and *u-aureum*. What did he mean by *u-aureum*?

I first collected on Mount Washington in 1890. I also during that same summer collected at Jefferson, New Hampshire, which is in the valley. I collected on Mount Washington and about Twin Mountain for several successive summers thereafter. My material was identified and named at that time mainly by comparisons made for me by Mr. Edwards and Mr. Neumogen.

At that time the Grote Check List was in common use, in which *vaccinii* does not occur, but *u-aureum* Boisd. does occur, the order being *u-aureum*, *mortuorum*, *octoscripta*, which was exactly as I placed them in 1902, with only slight rearrangement, viz., *rectangula* (syn. *mortuorum*) alias, *octoscripta*. *Alias* here replaces *u-aureum* because I decided that it does not fit the description of *u-aureum*, the name, however, which it was carrying in all Atlantic Coast collections. Hence my

denominating it "alias," it having passed under an assumed name as it were.

There is little doubt that "alias" is what Edwards had in mind when comparing his new species with *u-aureum*.

Prof. J. B. Smith tells us (Bulletin 44, U. S. Nat. Mus., p. 255) that the type of *vaccinii* is with Mr. Thaxter. This I believe is true, that type being at present at Cambridge, if I am not mistaken. But there is also a type in the Edwards collection, labeled correctly Mt. Washington.

Sir George Hampson lists this (Cat. Lep., vol. XIII, pp. 424-5) as *Syngrapha u-aurcum*, giving *vaccinii* as a synonym.

I do not wish to discuss the validity of this synonymy at the present time further than to state that *u-aureum* was described from Dalecarlia, a Swedish locality.

Hampson gives the distribution as follows: Canada—Nova Scotia. U. S. A.—New Hampshire, Mount Washington; New York, Adirondack Mts. Alpine, Grote.

Prof. Smith in his Bulletin says: Mt. Washington, Adirondack Mts., Nova Scotia.

Dyar in his catalog says: North Atlantic States.

It is my own opinion that *vaccinii* has never been taken elsewhere than above timber line on Mt. Washington or some other contiguous range. Personally I have collected on Mt. Washington and in the adjacent valleys at least during four seasons. I have always been able to take *vaccinii* at proper season above timber line. I have captured other Autographas on the summit, but never a *vaccinii* below it. Mrs. Annie T. Slosson, who, perhaps, has collected in this region more thoroughly and more constantly than any other collector, tells me that her experience has been similar.

Whence then the statements that *vaccinii* has occurred in Nova Scotia and in the Adirondacks? I have spent fifteen summers in the Adirondacks and never saw a *vaccinii* there.

I believe that we have here a case of false identification. For example, only recently I examined the specimens in the American Museum Collection in New York, mainly the Edwards collection. Under *vaccinii* I found four specimens, the

labels reading Mt. Washington, Adirondack Mts. and one other locality, which I do not recall. The point is that the Mt. Washington specimens were *vaccinii*, one labeled "type." The Adirondack specimen was my *alias*, formerly labeled *u-aureum* in American collections. The other specimen was *octoscripta*, the four specimens representing three species.

I may add that I have found exactly similar confusion of these species wherever I have looked over collections, with rare exceptions.

That is why I ask collectors to report to me if anyone has *vaccinii* from any locality other than the Presidential Range in New Hampshire. In case anyone has such a specimen, I should wish not only to hear of it, but to see it.

It has been said of some authors that they would not be able to recognize their own species if locality labels were removed. The converse seems to be true in this group.

In the American Museum in New York last spring I found a series which I declared were mixed. I separated them into *angulidens* and *excelsa*. After so separating them, I examined the locality labels. All that I had called *angulidens* were labeled Colorado and all the *excelsa* bore the label Laggan. *Excelsa*, however, was taken by myself in the White Mountains. But if anyone has *angulidens* from any region outside of Colorado, I should be glad to see the specimens. Similarly I would like to see *sackeni* from any locality other than Colorado, or *snowi* from any locality other than New Mexico. If anyone can confirm or disprove the above views, I should be indebted if he will correspond with me.



A Collecting Trip in Colombia.

Mr. E. B. Williamson, of Bluffton, Indiana, the well-known student of the Odonata, left his home on November 25 for a trip in Colombia, South America, where he will devote his energies to collecting his favorite insects. A card dated December 4 announced his arrival in Panama, where he expected to remain until the 7th. His plan is to return home in March.

A New Genus of Bothynotinae, Miridae (Heter.).

By M. WIRTNER, Monte Casino, Covington, Kentucky.

NEOBOTHYNOTUS new genus.

This, our first American genus of Bothynotinae may easily be recognized by examining the membrane which is pilose above and below.

Male oblong, female oval, or ovate in the short-winged female. Head subvertical, pilose, short, behind the exserted eyes, constricted, immarginate; vertex wide, somewhat convex; clypeus slightly elevated, separated at base from the frons, base on a line drawn between the antennal pits; lorae discrete; gula short, subhorizontal. Eyes medium, prominent, distinctly remote from the apex of the pronotum. Antennae inserted on a line drawn between the center of the eyes, strongly pilose, the basal joint incrassated, as long as or slightly longer than the width between the eyes; second longer than the third and fourth united, or three-fourths as long as the basal width of the pronotum, or a trifle shorter than the pronotum and the scutellum united, becoming (especially in the female) slightly thicker towards the apex. Rostrum reaching the intermediate coxae, the first joint passing the apex of the prosternum.

Prosternum triangular, sides straight and raised, its xyphus marginated; orifices of the metapleura tuberclose. Pronotum trapeziform, collar raised, hairy, posteriorly convex, towards the apex strongly declivous, basal width almost twice its length, or three times its apical width, deeply closely punctured; calli confluent at the disc forming an arc, shining, smooth. Scutellum triangular, hairy, the base covered, minutely transversely wrinkled, a carina beginning at the apex and disappearing in the depressed middle of the base.

Hemelytra rugose, hairy, lateral margins ampliated, in the male semipellucid, opaque in the female; subcosta entire, forming an embolium, cubitus also complete; the hairy cuneus and the membrane much deflected; membrane of the male very long, of the short-winged female reaching the end of the abdomen, biareolated, distinctly pubescent above and below.

Feet pilose, posterior femora reaching the apex of the abdomen, no thicker than the others. Tarsi: first joint longest, the second shortest. Claws without arolia but armed with a strong basal, acute tooth.

Neobothynotus modestus n. sp., type of the genus.

Body brown in the male, in the female piceous, shining. Head, prosternum, first joint of the antennae and the base of the second joint, the stricture, sometimes the base of the calli rufous. Head smooth, hairy, its width twice that of the eye; clypeus piceous. Ros-trum in the male testaceous, in the female nigropiceous, the second joint the longest, as long as the second joint of the antennae. Antennae, apex of the second joint piceous, in some females both the first and the second joints are nigropiceous, the slender third and fourth soiled white, the third longer than the fourth.

Pronotum deeply, closely punctured, hairy, brown in the male, in the female nigropiceous, calli (base always) piceous, stricture rufous. Scutellum deeply impressed at base, hairy, piceous.

Hemelytra rugose, minutely punctate, a row of more evident punctures on the subcosta, claval suture and on the commissure, the color the same as that of the pronotum and of the pilose cuneus. Membrane smoky, iridescent, rugose, pubescent above and below, its length in the male longer than the basal width of the pronotum, in the macropterous female as long as, and in the short-winged female three-fourths as long as the basal width of the pronotum; apex of the large cell wide, at the short round angle of this cell there are signs of two very short open apical veins; a white spot on the membrane below the cuneus.

Abdominal segments of the male rufous edged with black, in the female almost or entirely piceous.

Legs of the male testaceous, of the female sometimes entirely nigropiceous, the basal acute tooth of the claws about one-third the length of the claw. One short-winged female is entirely piceous excepting the top of the head and the stricture.

Length: male 5 mm., female 4 mm., short-winged female 3.8 mm.

Captured in September at Greensburg, Pennsylvania, with the sweepnet in Col. Huff's park. It is also found in Illinois.

Described from twelve specimens in the college collection.
Type: A male, Greensburg, Pa., in St. Vincent College coll., Beatty, Pa.*

The male of this species strongly resembles in color and general shape Reuter's figure (I, plate IV, vol. V, Hem. Gymn. Europae) of *Bothynotus pilosus* Boh.

*An allotype I will send to Philadelphia and a paratype to the Carnegie Museum, Pittsburgh, Pa.

Notes on the Feeding Habits of Adult Chrysopidae (Neur.).

By L. BRADFORD RIPLEY, Dep't. of Entomology, University of Illinois, Champaign, Ill.

All of the statements that I have been able to find concerning the feeding habits of adult Chrysopidae agree that "in the adult stage the insects feed little, or not at all."¹ This quotation, from Dr. J. B. Smith, refers to the genus *Chrysopa*. Howard informs us similarly that the adult *C. oculata* "does not feed,"² and Wildermuth, in his recent paper on the California Green Lacewing Fly,³ states that "neither sex has ever been noted by the writer to feed in the adult stage, even when food was offered, and doubtless all of the lacewing flies take little or no food in this period of their existence."

In the summer of 1916, in Glastonbury, Connecticut, the writer had occasion to keep in confinement many adults of *C. oculata* for the purpose of procuring eggs for embryological studies. The observation of these insects has afforded conclusive evidence contradicting this prevalent statement.

A large scarlet aphid common in New England, on the stems of Golden Glow (*Rudbeckia laciniata*), having been introduced into the cage, the smaller specimens were vigorously attacked by the chrysopids. The prey was grasped in the mandibles by the end of the abdomen, the juices sucked and the skin completely eaten. One female, while under observation, ate three aphids in rapid succession, but refused more food. These adults also drank from drops of water. When apple leaves were put in the cage, the insects ran over them rapidly, with their heads almost touching the leaves, as if searching for small insects or eggs.

Adults of both sexes, soon after being collected, or a few hours after feeding, were often observed to discharge black pellets from the anus, which appeared to be animal matter, as

¹ John B. Smith, Sc.D., Economic Entomology, p. 74.

² L. O. Howard. Insects, p. 225.

³ V. L. Wildermuth, California Green Lacewing Fly. Journal of Agricultural Research, Vol. 6, No. 14, 1916.

viewed with the microscope, so finely ground and digested, however, that no tissue was distinguishable.

After a few days of confinement without food or water, females invariably died a premature death, with many eggs in the abdomen unlaid, whereas fed females usually laid all, or nearly all, of their eggs.

Unfed females were observed to extract eggs from their own abdomens with their mandibles, and to devour them rapidly one after another. The performance of this operation by one individual was witnessed three times in less than one minute. Only those insects which had been confined without food and water for a few days were seen to resort to this source of nutriment. In several instances, females were seen trying to extract eggs in this manner without success, the eggs being, presumably, too far within the vagina to be reached by the mandibles.

Since this egg-eating habit is displayed only by unfed individuals, it is concluded that hunger is the chief stimulus to this reaction. Scarcity of food for adult Chrysopidae may have been of sufficiently frequent occurrence in the past to account for the development of the preservative instinct exhibited by the females, of eating the eggs. This instinct, however, does not permit the insect to subsist on its own eggs until its abdomen is emptied of them, as evidenced by the fact of death by starvation with many eggs still in the abdomen. The rate at which eggs are available for extraction by the mandibles is not sufficient to satisfy the demands for nutriment; however, when food is scarce, this egg-eating habit is doubtless of great preservative value in allowing the females to subsist from one meal of insects to another.

To summarize: (1) Adults of both sexes feed upon smaller, soft-bodied insects, drink water and discharge solid excrement. (2) Unfed females die of starvation, leaving a large portion of their eggs unlaid. (3) Females on the point of starvation eat their own eggs, extracting them from the abdomen as frequently as they are available—a preservative instinct.

Thus Chrysopidae are of even greater economic importance

than has been known, since the useful work of the notoriously predaceous larva is supplemented by the predaceous work of the adults. In the struggle for existence, however, the position of this family is decidedly less advantageous than formerly supposed, inasmuch as, not only the larval food, but also the amount of food available for the adult insect, is an important factor in determining the number of individuals.

A Species of *Macrotracheliella* found in New England (Hemip., Anthocoridae).

By H. M. PARSHLEY, Bussey Institution, Harvard University.

While examining not long ago some unmounted insects belonging to the Boston Society of Natural History, I found an Anthocorid bug unlike anything I had previously seen. I sent it with some other doubtful specimens to Mr. O. Heidemann, who returned it without comment as "*Macrotracheliella* sp.," another instance of my friend's well-known acumen and willingness to give others the benefit of his great knowledge of the Hemiptera. This genus was founded by Champion in the *Biologia*¹ to contain a new species, *M. laevis*, of which he had examples from Mexico and Panama. The occurrence of a very closely related species in New England is one of those troublesome facts of distribution which every now and then arise to confront us with our profound ignorance of what is or has been really going on, notwithstanding our theories of zones, soils, land-bridges, and so forth.

The specimen at hand agrees in every particular with Champion's generic diagnosis but differs from *M. laevis* in certain characters of specific value. For those who do not have access to the *Biologia* it may be of service to present the chief characters of the genus, especially as it has not been reported hitherto as occurring in the Nearctic region.

MACROTRACHELIILLA Champion.

Anterior lobe of pronotum narrow and conical forming a continuous outline with the elongated cylindrical basal part of

¹Biol. Cent.-Am., Ins., Rhynch. II., p. 322, Tab. 19, figs. 21, 22, 22a.

the head, apical collar present; eyes distant from the front of the pronotum; rostrum short, not reaching the front coxae. Embolium narrow, linear; membrane with only one vein, situated near the inner margin. Mesosternum greatly developed, convex, with a short anterior carina; metasternal ori-fices long, curved forward, reaching the lateral and anterior borders of the metapleurae. Legs slender, the femora somewhat thickened. Body oblong, shining, clothed with sparse hairs. Wing-cell with a hamus.

This genus belongs to the Anthocorinae and should be placed before *Anthocoris* which is easily distinguished from it by the much less elongate head and pronotum and the 4-veined membrane. *Triphleps* contains smaller species with 3-veined membrane.

***Macrotracheliella nigra* sp. nov.**

Shining black, third antennal segment narrowly yellow at base, tarsi dark brown, paler beneath. First antennal segment not quite reaching apex of head, second about twice the length of the first, enlarged in apical half, third somewhat longer than the first, fourth missing. Pronotum impressed just within the slightly knobbed lateral angles, posterior lobe convex, very finely punctate, declivous, meeting the impunctate horizontal anterior lobe in a sharply defined transverse line. Scutellum convex and finely punctate basally, the apical half strongly depressed, flat, transversely rugose, acute at apex. Hemelytra very obscurely punctate, the corium longitudinally convex, the cuneus deflected and slightly concave; membrane extending beyond apex of abdomen, brown, narrowly pale along lateral half of cuneal margin and at the inner basal angle. Clothed above and below with very sparse erect hairs, legs and antennae sparsely pilose, the pubescence of the tibiae finer and close. Length 2.5 mm.

Holotype ♀, Chilmark, Massachusetts, 14 Aug., 1911 (J. A. Cushman), in the collection of the Boston Society of Natural History.

Closely related to *M. laevis* Champ., to judge by the description and figures, but differs from that species in having the third antennal segment pale only at base and the hemelytra entirely black while the first and second antennal segments are shorter. (In the type specimen the fourth antennal segments have been broken off).

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., JANUARY, 1917.

The News for 1917.

The rising cost of living and of everything else has begun to affect the News but we shall not let it affect our subscribers if it be possible to avoid doing so. We shall not raise our subscription price or reduce the number of pages as long as our many present friends stand by us. We think we have been giving as much (or more) in return for the annual sum of two dollars as any other entomological journal in the world and we don't propose to fall behind our past record in this respect. On the other hand, to run into bankruptcy would defeat the very objects for which the News exists and it therefore seems advisable to adopt the following precautionary measure. We shall limit the number of plates in each issue to one or two, except where authors supply the blocks for the plates accompanying their articles or pay for making blocks. This may mean that illustrated papers may be somewhat retarded in their publication, but the ways to secure earlier appearance are obvious.

We take this opportunity of reminding our contributors of the desirability of carefully considering the limitations under which reproduction of drawings and of photographs can be made. When these are to be reduced in size in order to come within the dimensions of an average News plate ($6\frac{1}{2}$ by 4 inches), it must be remembered that the details of drawing or of photograph must be so far apart that, when brought *nearer* together by the necessary amount of reduction of the whole plate, they will still be far enough apart to be distinct. This also involves the distances of the various figures on the same plate from each other. Also, since all the figures on a given plate are reduced at once and made into a single block, all the figures must be on such a scale as to bear the same amount of

reduction. If a plate must be printed from several blocks its cost is increased, for several blocks are more expensive than one single block whose area is equal to the sum of the several. A little careful measurement of the "copy" and calculation will often save much time and disappointment in the appearance of the published illustrations.

Drawings can usually be reproduced in zinc, but drawings with fine details and photographs require copper, which at present costs twice as much as zinc. All drawings must be made with jet black ink, not the common bluish writing ink which will not photographically reproduce. A half-tone, which is the form in which photographs are reproduced, ordinarily shows the background of the photograph, hence if several photographs are associated side by side to form a plate and their backgrounds are of different shades of color, this difference shows also in the half-tone when printed and produces a displeasing effect. All cutting away of backgrounds or any manipulation necessary to remove imperfections in the photograph is only done at additional charge.

Questions and Answers.

The News invites those having any entomological questions which they wish answered to send such in for publication under this heading, and also invites answers from its readers or others to these questions. Questions and replies should be as brief as possible and the Editors reserve the right not to publish any of either class which seem to them objectionable or inappropriate. Those sending in contributions to this department will please indicate whether they wish their names or merely one or more initials to appear in connection with their communications, but all such must be accompanied by the full name and address of the writer for the information of the editors.

QUESTION No. 3—Green geometers usually lose much of their color in the relaxing jar. Can this be avoided and how? I would like to hear from Lepidopterists on the subject.—G. C.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Psyllia buxi Linn. in New Jersey (Homop.).

During the summer of 1916 adults of this species were taken at Springfield, Rutherford, East Orange and Riverton on boxwood plants growing in nurseries. The plants on which they were found were old and well established, having been imported a number of years ago, so there is no doubt about the species being established in New

Jersey. The curled condition of the foliage due to larval activities is quite a common occurrence on boxwoods imported from Holland and it was undoubtedly introduced from this country. It is probably also established in other parts of New Jersey, especially on estates where boxwood hedges and plantings are common and surely must occur in other Eastern States too, inasmuch as it has been mentioned at different times in the News Letters of the Federal Horticultural Board as being found on imported boxwoods. Considering its method of overwintering, it is evidently being introduced more or less regularly every time imported boxwoods are received in this country.

In Smith's "Cat. Ins. of N. J.," p. 109, can be found the following note: "*Psylla buxi* Linn. An imported species on *Buxus sempervirens*, which has been found in Jersey City." This does not however lead one to assume that it is established in New Jersey. In Van Duzee's Check List of the Hemiptera of America, North of Mexico, it is not recorded.

A brief account of *Psyllia buxi* in Holland and its importance as a pest can be found on page 176 of Vol. I, "Ziekten en Beschadigingen der Tuinbouwgewassen" by M. Van Den Broek en P. J. Schenk. This article states that adults appear in May and June depending on the temperature and locality and that later about the time the plant has formed new buds for next season, each female lays from one to three eggs on the leaves at the tips of the branches. These hatch before winter and the nymphs which are covered with a white, waxy substance hibernate under the buds in the axils of the leaves. When the buds develop in the spring, the whitish masses covering the nymphs are readily seen. The injury resulting from the activity of the nymphs consists in a curling of the leaves so that they resemble little cups or hollow hemispheres.

In New Jersey adults were taken about the middle of July and also in August and the tips of the branches of many plants showed the characteristically curled leaves. According to the Dutch authors, good results were obtained in the way of control by spraying in the spring with a 7.5 per cent. of soluble carbolineum emulsion. As far as is known, no remedial measures have ever been attempted against this insect in New Jersey. In fact, many persons have assumed that the peculiar curling of the leaves is characteristic of boxwoods and certainly no great disfigurement takes place provided the infestation is slight.

H. B. WEISS & E. L. DICKERSON, New Brunswick, N. J.

The O. B. Johnson Entomological Collection.

Orson Bennett Johnson, professor emeritus of zoology in the University of Washington, has given the university his valuable entomological collection.—*Science*, Nov. 3, 1916, p. 635.

Phylogeny of Ant Lions (Neur.).

There has been a general agreement in looking upon the Nymphidae, a small family confined to Australia, as representing the probable type from which the Myrmeleontidae have been developed. But this agreement is not, so far as I can ascertain, based on any definite evidence, but merely on a general impression of the Myrmeleontid-like appearance of the well-known *Nymphes myrmecleonides* Leach. We now have definite venational evidence to go upon, and we may say at once that it fully establishes the claim of the Nymphidae to be regarded as the remains of the ancestral group from which the Myrmeleontidae have sprung, the course of evolution being marked by gradual reduction in the general density of venation, in the size and prominence of the pterostigma and in the length of the antennae (which become stouter and clavate) and by a change from a wandering (probably nocturnal), carnivorous larva, with omnivorous tastes, to a sedentary, pit-dwelling, ant-feeding form.—R. J. TILLYARD. (Condensed from *Proceedings, Linn. Soc. New South Wales*, 1915, pt. 4, pp. 743, 745. 1916.)

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new species are all grouped at the end of each Order of which they treat. Unless mentioned in the title, the number of the new species occurring north of Mexico are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

4—The Canadian Entomologist. **5**—Psyche. **9**—The Entomologist, London. **10**—Nature, London. **47**—The Zoologist, London. **68**—Science, New York. **102**—Proceedings, Entomological Society of Washington. **143**—Ohio Journal of Science, Columbus, Ohio. **153**—Bulletin, American Museum of Natural History, New York. **198**—Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. **240**—Maine Agricultural Experiment Station, Orono. **251**—Annales, Sciences Naturelles, Zoologie, Paris. **285**—Nature Study Revue, Ithaca, N. Y. **313**—Bulletin of Entomological Research, London. **324**—Journal of Animal Behavior, Cambridge. **394**—Parasitology, Cambridge, England. **421**—Report, State Entomologist on the Noxious and Beneficial Insects of Illi-

nois, Urbana. 447—Journal of Agricultural Research, Washington. 450—Apuntes de Historia Natural, Buenos Aires. 457—Memoirs of the Coleoptera by Thos. L. Casey, Washington. 478—Miscellaneous Publications, Museum of Zoology, University of Michigan. 540—The Lepidopterist. Official Bulletin, Boston Entomological Club.

GENERAL SUBJECT. Bodkin & Cleare—Notes on some animal parasites in British Guiana, 313, vii, 179-90. Brown, K. B.—Microtechnical methods for studying certain plant-sucking insects *in situ*, 68, xliv, 758-9. Turner, C. H.—Literature for 1915 on the behavior of spiders and insects other than ants, 324, vi, 383-99. Ramsay, E. P.—Hints for the preservation of specimens of natural history, 82 pp. (Australian Museum, Miscel. Pub. No. 5).

PHYSIOLOGY AND EMBRYOLOGY. Hoy, W. E., Jr.—A study of somatic chromosomes. 1. The somatic chromosomes in comparison with the chromosomes in the germ cells of *Anasa tristis*, 198, xxxi, 329-63.

MEDICAL. Dunn, E. R.—Mosquitoes and man again, 68, xliv, 788-90.

ARACHNIDA, ETC. Levy, R.—Contribution a l'étude des toxines chez les araignées, 251, Ser. X, i, 161-399. Robinson, H. W.—Some species of tick infesting polecat and otter [Bibliog. notice], 47, 1916, 399.

NEUROPTERA, ETC. Harrison, L.—The genera and species of Mallophaga, 394, ix, 1-156. Williamson, E. B.—Directions for collecting and preserving specimens of dragonflies for museum purposes, 478, No. 1, 15 pp.

HEMIPTERA. Baker, A. C.—A synopsis of the genus *Calaphis* [2 n. sps.], 102, xviii, 184-89. Baker & Turner—Rosy apple aphid, 447, vii, 321-44. Cushman, R. A.—The native food plants of the apple red-bugs, 102, xviii, 196. Van Duzee, E. P.—Note on genus *Hyoidea*, 5, 1916, 141.

Osborn & Drake—Some new sps. of nearctic Tingidae [7 n. sps.], 143, xvii, 9-15.

LEPIDOPTERA. De Gryse, J. J.—The hypermetamorphism of the lepidopterous sapfeeders, 102, xviii, 164-8. Heinrich, C.—On the taxonomic value of some larval characters in the L., 102, xviii, 154-64. Lathy, P. I.—A new South American *Papilio*, 9, 1916, 241-2. Reiff, W.—Lepidopterological items from Massachusetts, 540, i, 3-5. Wolley-Dod, F. H.—A change of synonymy in *Xylomigis*, 4, 1916, 367-8.

Bartsch, R. C. B.—Two new forms of Catocalae, 540, i, 3. Beuttenmuller, W.—Description of a new sesiid, 4, 1916, 372. Busck, A.—Descriptions of new No. American micro L. [1 n. g., 15 n. sps.], 102, xviii, 147-54. Eastman, W. F.—A new form of *Catocala pura*, 540, i, 2. Gibson, A.—A n. sp. of tortrix of economic importance from Newfoundland, 4, 1916, 373-5. Swett, L. W.—New species of Geometridae from California, 450, i, 5-6 (cont.).

DIPTERA. Howard, L. O.—A curious formation of a fungus occurring on a fly, 102, xviii, 196-7. Hutchison, R. H.—Notes on the larvae of *Euxesta notata*, 102, xviii, 171-77. Knab, F.—Egg-disposal in *Dermatobia hominis*, 102, xviii, 179-83. Metcalf, C. L.—Syrphidae of Maine, 240, Bul. 253. Walton, W. R.—The tachinid genus *Argyrophylax*, 102, xviii, 189-92. Webb & Hutchison—A preliminary note on the bionomics of *Pollenia rudis* in America, 102, xviii, 197-9. Weiss, H. B.—*Monarthropalpus buxi* in N. J., 5, 1916, 154-6.

Brues, C. T.—A remarkable n. sp. of *Phora* (*Trineura*), 4, 1916, 394-5. Parker, R. R.—Sarcophagidae of New England, III, *Sarcophahrtia ravinia*, new gen. and sp., 5, 1916, 181-9.

COLEOPTERA. Allard, H. A.—The synchronal flashing of fireflies, 68, xliv, 710. Barber, H. S.—A new sp. of weevil injuring orchids, 102, xviii, 177-9. Craighead, F. C.—The determination of the abdominal and thoracic areas of the cerambycid larvae as based on a study of the muscles, 102, xviii, 129-46. Forbes, S. A.—Life history and habits of the northern corn root-worm (*Diabrotica longicornis*), 421, xxviii, 80-86. Frost, C. A.—Collecting notes and random observations of the Maine C., 4, 1916, 381-90. Hyslop, J. A.—*Pristocera armifer* parasitic on *Limonius agonus*, 102, xviii, 169-70. Sell, R. A.—Ways of the western flower beetle, 285, xii, 332-4.

Casey, T. L.—Further studies in the Cicindelidae [many new]; Some random studies among the clavicornia [many new], 457, vii, 1-34; 35-292. Wickham, H. F.—A new brachelytrous trogositid beetle from Colorado, 5, 1916, 146-8.

HYMENOPTERA. Bradley, J. C.—Taxonomic notes on Agathinae (Braconidae), 5, 1916, 139-40. Gray, H. St. G.—Scarcity of wasps, 10, 1916, 209. Middleton, W.—Notes on *Dianthidium arizonicum*, 102, xviii, 193-5. Wells, M.—Literature for 1915 on ants and myrmecophils, 324, vi, 400-406. Wheeler, W. M.—Note on the Brazilian fire-ant, *Solenopsis saevissima*; An anomalous blind worker ant, 5, 1916, 142-3; 143-5. Williams, L. T.—Notes on the egg-parasites of the apple tree tent-caterpillar (*Malacosoma americana*), 5, 1916, 148-53.

Cockerell, T. D. A.—Some California bees [3 new], 4, 1916, 391-3. Girault, A. A.—A new genus of omphaline Eulophidae from N. America [1 n. sp.], 9, 1916, 249-50. Rohwer, S. A.—Notes on the Psammocharidae described by Provancher, with description of a n. sp., 4, 1916, 369-72. A new bee of the genus *Dianthidium*, 102, xviii, 192-3. Viereck, H. L.—New sps. of the bee genus *Andrena* in the American Mus. of Nat. History [4 new], 153, xxxv, 729-32.

THE LEPIDOPTERIST: Official Bulletin of the Boston Entomological Club.

Volume One, number one (four pages) of this publication has appeared. The editor is Rudolf C. B. Bartsch, Roslindale, Massachusetts. The price of subscription is thirty-five cents a year. The last publication devoted to Lepidoptera exclusively was "Papilio" and it died about thirty-three years ago. "The (Boston) Club has one feature which is new to entomological societies of this country. After each regular business meeting the Club holds an auction sale of specimens belonging to various members. A ten per cent. commission is charged which is placed in the treasury of the Club." Can you imagine such a thing in Boston! The Club advocates the publication of a priced catalog of lepidoptera to facilitate exchange among collectors. The editor appears to be the president of the "Kato Kalo Co.," which deals in the Catacolae of the world. A new species and several new varieties are described, but the dominant idea of the Club and the journal seems to be commercialism. There may be a place in the sun for a new journal of this kind which will appeal to the beginner and the collector and we will watch the experiment with interest. If something is not done for the embryo entomologist there is danger that the veterans may die off much faster than the ranks are recruited. The activities of our older entomological societies are too profoundly scientific to encourage or interest the tyro, who is to become the scientific entomologist of the future.

—H. S.

Doings of Societies.

American Entomological Society.

Meeting of October 26, 1916, in the Academy of Natural Sciences of Philadelphia. Dr. Henry Skinner, president, in the chair. Eleven persons present.

Dr. W. J. Holland and Dr. W. L. Abbott were elected to resident membership.

Mr. Rehn made some interesting remarks on the Arizona field work of the past summer carried on by Dr. F. E. Lutz and himself, in the interests of the Academy and of the American Museum of Natural His-

tory. Several particularly interesting ranges of mountains in southern Arizona were visited and examined for general entomological material, but particularly for certain Lepidoptera and Orthoptera. The results were quite satisfactory and much information and evidence relative to the distribution and occurrence of insects were secured. The remarks were illustrated by a map of the region visited.

These remarks led to a discussion on night collecting with light, and Dr. Skipner mentioned collecting Sphingidae in Cuba late at night or early in the morning when the insects became chilled and in this condition on walls, etc., could be easily bottled, and thus perfect specimens secured.

Orthoptera.—Mr. Laurent exhibited nymphs, adults and egg-masses of *Paratenodera sinensis*, and read a paper by Prof. W. Lochhead in the *Report of the Entomological Society of Ontario* for 1914, page 64, speaking of the writings of Jean Henri Fabre, from which he quotes statements regarding the Praying Mantis (probably *Mantis religiosa*). *Paratenodera sinensis* female, as observed around Philadelphia, does not differ from what Fabre states for *Mantis religiosa*. On September 20th Mr. Laurent placed a female in a large cage along with three males. Within five minutes a male copulated with the female, and before the day was over the "husband" paid for his rashness with his life. The female ate the entire insect excepting the two hind legs and wings. From the 20th of September until the 14th of October she devoured six husbands—when she died without laying eggs. Although there were at all times from three to six males in the cage, yet the female only molested those that copulated with her. In the vicinity of Philadelphia the eggs of *sinensis* hatch about the middle of May. By the end of August the majority of the insects are fully developed, and from then on to about the 20th of October mature specimens can be captured. These remarks were followed by discussion by Messrs. Wenzel, Hornig, Skinner and Ilg.

Coleoptera.—Mr. Wenzel exhibited a specimen of typical *Megetra vittata* and a very large specimen supposedly of this species lately received from the Hueco Mountains, New Mexico, northeast of El Paso.—ROSWELL C. WILLIAMS, JR., *Recording Secretary.*

Newark Entomological Society.

Meeting of November 12, 1916, held in the Newark (New Jersey) Public Library. Pres. Buchholz in the chair and twelve members present. Mr. A. Goerner of Jersey City was elected a member.

Lepidoptera.—Mr. Rummel exhibited *Apatura celtis* from Hagerstown, Maryland, VI-29 and *Apatura clyton* from Arlington, New Jersey, VIII-4, and spoke of his experience with and of the secretive habits of the adults of the latter species. He also mentioned finding

thousands of the larvae on hackberry during October and later in the season under foliage at the bases of the trees. He exhibited hundreds of second stage larvae which he had collected at Arlington. Mr. Weiss showed two species of Geometridae which had been captured by the sticky nectar of the mosquito plant, *Vincetoxicum japonicum*, and also dried specimens of the plant.

Hymenoptera.—Mr. Weiss spoke of finding the European saw fly, *Diprion simile* Hartig, in New Jersey this past summer, and of its injury to pines and exhibited a male and a female.

Coleoptera.—Mr. Weiss exhibited two orchid weevils new to New Jersey, these being *Acypotheus orchivora* Blackb., and *Diorymellus laevimargo* Champ., both being injurious to greenhouse orchids, the latter species only recently having been described by Champion.—
HARRY B. WEISS, *Secretary.*

Entomological Section, The Academy of Natural Sciences,
Philadelphia.

Meeting of November 23, 1916. Nine persons present. Mr. R. C. Williams, Jr., Vice-Director, presiding.

Mr. McAtee, of Washington, D. C., spoke of his interest in working up the local fauna of that vicinity.

Diptera.—Mr. Hornig reported the finding of fresh pupae of the house fly on the 20th of this month which he considered noteworthy in view of the prevailing cold weather.

Lepidoptera.—Mr. Ilg exhibited some specimens of the Io moth which he said are emerging now in his room. He said that birch was the food plant of these moths. Dr. Calvert called attention to a communication by Dr. Carpenter in the *Proceedings of the Entomological Society of London* (for 1915, pages lxix-lxxii) relative to his observations in South Africa of birds eating butterflies. The birds seemingly preferred the Lycaenidae to the Pierinae. Mr. McAtee spoke of his investigation of birds as agents in the destruction of insects. He stated that, although there seems to be conclusive proof that birds eat butterflies, the quantity consumed evidently cannot materially affect their survival. He further stated that according to his observations a species is never exterminated by its natural enemy.

Orthoptera.—Mr. Rehn made a few interesting remarks on the auditory foramina found on the cephalic tibiae of Tettigoniidae and Gryllidae, with particular reference to the external development of the same found in certain genera of the Gryllotalpinae. The features separating *Gryllotalpa* and a new genus related to the same were discussed and material illustrative of this exhibited. Mr. Rehn said in answer to a question that the function of the so-called auditory organs has not been definitely determined. A lengthy discussion followed as

to the correlation of certain characters such as size of the stridulating apparatus and ocelli in short and long wing forms of Orthoptera; also regarding the correlation of the size of the eyes and the habits of animals in relation to light and darkness.

Meeting of December 11, 1916. Eleven persons present. Director Philip Laurent presiding.

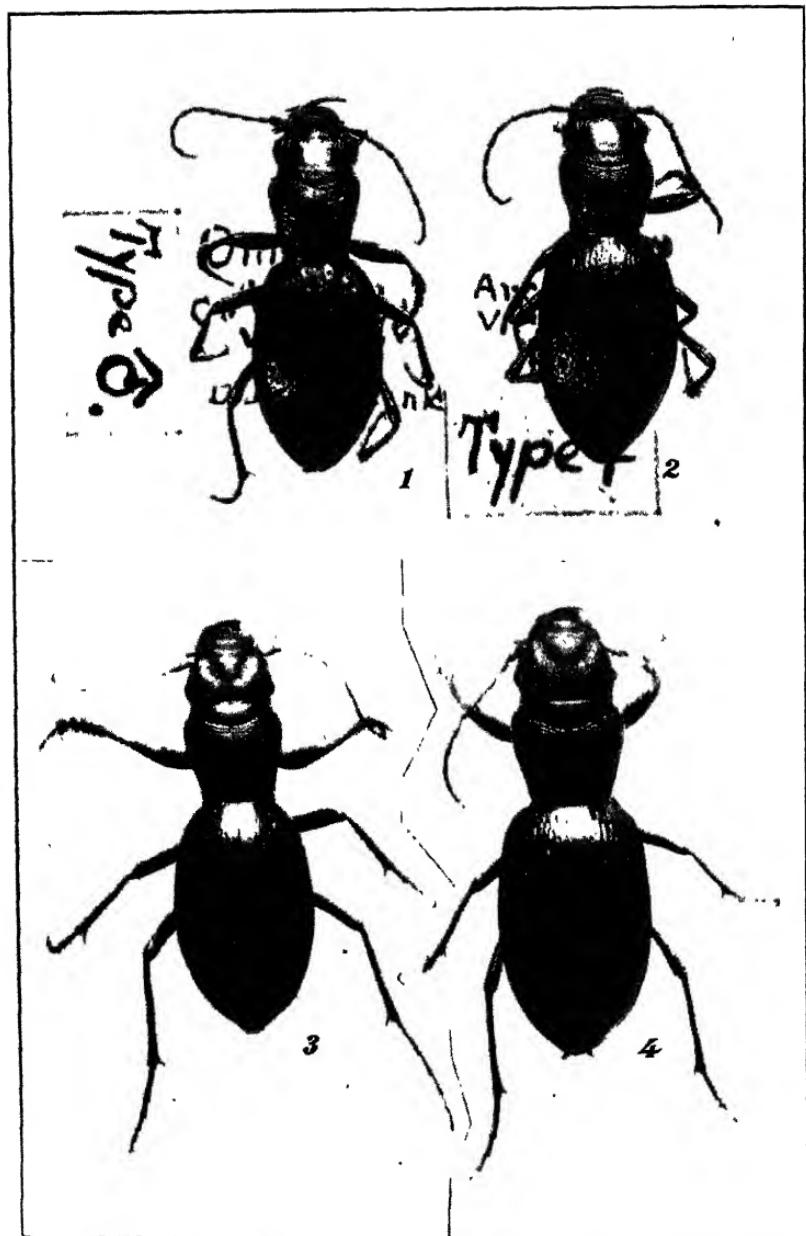
Coleoptera.—Mr. Laurent exhibited a collection of twenty-six species of Coleoptera and a number of other insects that he had collected in molasses traps during the past summer. The traps consisted of jelly glasses containing about an inch of molasses, which were sunk in the ground so that the tops of the glasses would be level with the surrounding surface; about an inch and a half above the top of the glass a flat stone or piece of wood was placed so as to keep out the rain. The speaker stated that few collectors ever tried this way of collecting. The principal beetles that fall victims to the traps are Carabidae.

Mr. Hebard spoke of his experience with molasses traps in collecting insects, especially Orthoptera. He mentioned a time while collecting in New Jersey, during the migration of the army worm when his traps were so filled with specimens of this species that he had to give up his quest for Orthoptera. He further stated that sinking these traps at various places having diverse environments resulted in interesting captures and showed that certain species are more confined to certain localities or habitats than is generally realized. The speaker also stated that he has tried to find specimens of some of the species caught in such traps, by making thorough search over a large area around the traps, looking under stones, pieces of wood, etc., but never has had any success. He said that this method of collecting, viz., with molasses traps, does not seem to be satisfactory in the tropics. General discussion followed principally on the apparent abundance of one sex of a species while the other sex is seldom or never seen.

Mr. Williams called attention to some passages in "The Nightside of Japan," by Fujimoto, which describes the interest Japanese take in the song of insects; a society has been formed in Tokyo for hearing insects sing, the "Mushi-Hanachi-Kai" (Meeting of Setting Insects Free).

The following officers were elected for the year 1917: *Director*, Philip Laurent; *Vice-Director*, R. C. Williams, Jr.; *Treasurer*, E. T. Cresson; *Conservator*, Henry Skinner; *Secretary*, J. A. G. Rehn; *Recorder*, E. T. Cresson, Jr.—E. T. CRESSON, JR., *Recorder*.

The number of Entomological News for December, 1916, was mailed at the Philadelphia Post Office December 6, 1916.



OMUS CUPREONITENS—BLAISDELL AND REYNOLDS.

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A New *Omus* (Coleop.).

By F. E. BLAISDELL, SR., and L. R. REYNOLDS, San Francisco, California.

(Plate VI)

A recent collecting trip to Humboldt County, California, brought to light several very interesting facts and what is believed to be a new species of *Omus*, which may be defined as follows:

Omus cupreonitens, n. sp.

Elongate, glabrous, deep black and shining; lustre varying from cupreous to glossy black.

Head moderate, as wide as the pronotum, or slightly narrower; eyes feebly prominent; interocular region adjoining the clypeal base prominent and convex, polished, very sparsely punctulate and feebly rugulose at its periphery, and defined laterally by distinct frontal impressions; remaining frontal region irregularly and moderately coarsely rugulose, the upper part of each frontal impression exhibiting a distinct vortiginous spot when viewed vertically from above, the adjacent rugulae being concentrically arranged; supraorbital rugulae parallel;

clypeus usually glabrous or with a few obsolete rugulae laterally; labrum almost truncate to feebly lobed at middle, the angles being sub-prominent and narrowly rounded; mouth parts nigropiceous; antennae reaching beyond the prothoracic base and moderate in stoutness.

Pronotum a little wider than long, sides feebly arcuate anteriorly, thence almost straight and converging to the base, bead fine and not quite entire at base, not interrupting the sub-marginal groove, the propleura visible posteriorly when viewed from above; disc convex, feebly so in the central area, strongly so laterally and apically, less so before the basal angles, sub-apical and sub-basal transverse impressions distinct, median longitudinal line distinct and more or less impressed and quite obsolete beyond the transverse impressions, surface vermiculately rugulose, rugulae in the apical area somewhat longitudinal and somewhat obsolete; apex transverse; base transverse and very feebly bisinuate.

Propleura feebly and more or less transversely rugulose. Lateral plates of the prosternum obsoletely rugulose, the rugulae crinkly and transverse. Prosternum glabrous.

Elytra oval, to slightly oblong oval, about one-third longer than wide, sides evenly arcuate and sub-parallel in the middle third; humeri not angulate, broadly rounded or obsolete; sides more or less oblique in apical third and arcuately converging to the obtusely rounded apex, marginal bead rather fine; disc moderately convex, irregularly punctuate, punctures moderate and sub-equal throughout, well separated and equally distributed; nine to eleven setigerous punctures more or less impressed and visible to the naked eye, surface microscopically reticulate.

Epitheura glabrous at base, elsewhere obsoletely crinkled.

Meso- and *metasterna* glabrous shining. Mesothoracic side plates obsoletely rugulo-strigulose; metathoracic side plates more or less longitudinally strigulo-rugulose.

Femora sparsely and feebly sculptured.

Abdominal surface glabrous and shining.

Male. (Fig. 1.)—Fifth ventral segment deeply emarginate at middle, sinus evenly rounded at the bottom, as wide as deep, depth equal to about one-third of the segment, lateral lobes evenly rounded from within and at apex. First three joints of the metatarsi equal to the length of a metafemur. In the type (Fig. 1) the humeri are intermediate between those of Fig. 3 and Fig. 2 (♀ Type).

Female. (Fig. 2)—Fifth ventral segment ogival at apex—sides quite straight and converging to form the very narrowly rounded apex.

Measurements: ♂. Total length, 15.0 mm.; of elytra, 7.75 mm.; width, 4.5 mm. Length of pronotum, 3.0 mm.; width, 3.5 mm.

♀. Total length, 15.5 mm.; of elytra, 8.5 mm.; width, 5.0 mm. Length of pronotum, 3.0 mm.; width, 3.6 mm.

Habitat.—Humboldt County (shore of Humboldt Bay near Arcata), California. Collectors, Blaisdell and Reynolds. Number of specimens studied 150.

Types in the collection of F. E. Blaisdell. Co-types in both the authors' collections.

It requires considerable courage to describe a new *Omus*, when so many are being described and founded on what are ostensibly intraspecific variations of known species.

The unique habitat of *cupreonitens* makes it of especial interest. It appears that general habitus when studied in a large series is a more reliable criterion than details, which vary in degree to such an extent in intraspecific forms as to be truly misleading.

Diagnostic Characters. *Cupreonitens* has a form more like *californicus* than any other, while the elytral sculpturing is that of *audouini*; the pronotal rugulosity is not like that observed in *californicus*, but less dense and coarser. In coloration it is said to resemble *vandykei*.

The type of *vandykei* was found by Dr. Walter Horn in the Rivers collection. Prof. Rivers had labeled it *submetallicus*, and it is the only known specimen, having been collected in middle Oregon. Mr. F. W. Nunenmacher has collected other specimens in Humboldt County, that have been referred to this species, but we believe doubtfully. There is before us a specimen collected at Dyerville, central Humboldt County, and in the Fuchs collection; it was obtained from Essig, who received it from Dr. Horn, if it is correctly labeled. It is not the same as *cupreonitens*. *Californicus* and *cupreonitens* are coastal species, and in all probability have the same ancestry. *Vandykei* from central Oregon is related to *audouini*, *oregonensis* and *humeroplanatus*, the latter being abundant in Humboldt County (Green Point Ranch).

We do not propose to study species of *Omus* from *uniques* or from series of ten or twenty, but from series of fifty and upward. Each series must be collected in a single geographical area.

DETAILS OF THE HABITAT OF CUPREONITENS.

The series constituting the present study was taken on the clay banks of Humboldt Bay, and separated by a dike and redeemed marshes from the main land. The species lives in the transitional area between high water mark and the dike above mentioned. The highest elevation of the transitional area is not over five feet above sea level and consists of the irregular clay dumpings of a dredger, the inland side of which is overgrown with swamp grass, millefoil and a few weeds. The first specimens were taken from beneath logs and boards left by high tide. *Trechus oripennis*, *Anisodactylus californicus* and *Bembidia* were their companions. Many specimens were caught running over the bare clay banks, both when the sun was shining and when the weather was cloudy. They were taken in the greatest numbers on the intermediate and drier levels, from beneath boards and by digging the matted grass apart. Larval burrows were everywhere abundant on the inland side of the clay dumps. Twelve larvae were dug out of a piece of bank twelve inches square. The larvae are to be sent with others of the Blaisdell collection to the University of Illinois, where they will be studied. It is hoped that some definite relationships will be determined in this way.

Let it be carefully noted that the present species is founded upon the study of a series of one hundred and fifty specimens. Such a series shows the extremes of the specific aggregate. All the specimens were taken in the same area, which was about one-fourth of a mile long and twenty-five feet wide and as described above. The variations included in the series are analogous to those exhibited by similarly large series of other species taken in any *one geographical area*.

A species studied in this way can have its limitations more understandingly worked out. The authors' collections include large series of *californicus*, *sequoiarum*, *edwardsii*, *blaisdelli* and *ambiguus*; some of the series of the same species are from different geographical regions or areas and exhibit identical variations, with some one particular intraspecific phase predominating. These series show beyond all cavil that many of

the recently described species are nothing more or less than the extremes, sports or aberrations belonging to well-known specific aggregates. When the last word shall have been spoken—if that occurs before evolution has had time to act—probably two-thirds of the fifty-two described species and varieties will fall into synonymy as *forms* (intraspecific variations) ; the remaining one-third will be species with their subspecies or races.

Before drawing this paper to an end it will be worth while—and helpful to the susceptible—to study some of the intra-specific variations or forms.

MEASUREMENTS OF THE EXTREMES OF *CUPREONITENS*.

Smallest Male. Total length, 14.0 mm.; of elytra, 8.0 mm.; width, 4.3 mm. Length of pronotum, 3.0 mm.; width, 3.2 mm.

Largest Male. See type.

Smallest Female. Total length, 14.0 mm.; of elytra, 7.0 mm.; width, 4.3 mm. Length of pronotum, 3.0 mm.; width, 3.3 mm.

Largest Female. Total length, 17.0 mm.; of elytra, 10.0 mm.; width, 5.5 mm. Length of pronotum, 3.75 mm.; width, 4.2 mm.

SPECIMEN SHOWING THE GREATEST AMOUNT OF VARIATION AS REGARDS ELYTRAL SCULPTURING.

Female.—Total length, 14.5 mm.; of elytra, 8.1 mm.; width, 5.0 mm. Length of pronotum, 3.0 mm.; width, 3.2 mm. The setigerous punctures of the elytra are more noticeably impressed and subfoveate, eleven in number on each elytron and arranged in two rows. This specimen would without doubt be described as a new species if separated from the aggregate. As a control an abundance of intermediates are at hand.

In numerous specimens the setigerous punctures are not impressed and therefore not visible without a hand lens. The visible subfoveate punctures by no means represent all of the setigerous punctures, especially those of the humeral and apical regions.

In *cupreonitens* the mental tooth is recurved, narrow and deeply grooved, and variable as regards those characters. The largest female has the lateral bead of the pronotum meeting the basal bead and interrupting the basal sub-marginal groove so that it does not pass on to the basal border of the propleura.

In the smallest male the marginal bead does not join the basal bead and the submarginal groove at base passes continuously onto the basal border of the propleura. Similar inquiry into the variations of the other species shows the same variations in specimens caught in the same geographical area. The list includes *californicus*, *dejeani*, *sequoiarum*, *lecontei* and *ambiguus*.

VARIATIONS IN *OMUS BLAISDELLI*.

The male has the mental tooth subacute, surface plane, and recurved as usual. In the females the mental tooth is stouter, more rounded at apex and the surface is plane. Variation: tooth less recurved and distinctly truncate at apex. The lateral marginal bead of the pronotum joins the basal bead in all the specimens at hand.

MEASUREMENTS: *Smallest Male*. Total length, 16.0 mm.; elytra, 9.8 mm.; width, 4.8 mm. Pronotum—Length, 3.2 mm.; width, 4.0 mm.

Largest Male. Total length, 18.0 mm.; elytra, 10.5 mm.; width, 6.0 mm. Pronotum—Length, 3.8 mm.; width, 4.1 mm.

Smallest Female. Total length, 19.0 mm.; elytra, 11.0 mm.; width, 5.5 mm. Pronotum—Length, 3.5 mm.; width, 4.5 mm.

Largest Female. Total length, 21.0 mm.; elytra, 12.0 mm.; width, 6.1 mm. Pronotum—Length, 4.0 mm.; width, 5.1 mm.

The above measurements have been made from specimens, selected from a series of twenty-two specimens that were collected on the same one-fourth acre of land (Davis Meadow, near Glencoe, Calaveras County, California) bordering a small meadow and sparsely covered by bull-pines. They were living absolutely under the same environment. Seven of the specimens have no humeri, and fifteen specimens have broadly rounded humeri. In the seven, the lateral elytral border passes directly and obliquely backward from the elytral base. One male has very nearly the form of *augusto-cylindricus*, and the elytra are just slightly wider than the pronotal base. The seven without humeri are undeniably like *intermedius*. Intermediates connect the two extremes. Such are the variations presented by a small series in which there can be no doubt of specific identity. No mention is made of a similar series taken two miles distant, for if the two series were mixed there might

be reasonable ground to argue that two different races or species were involved. Similar series of *edwardsii*, *sequoiarum*, *audouini*, *lecontei*, *humeroplanatus* and *cupreonitens* tell the same story. The extremes of a specific aggregate are heterotypes. The specific aggregate of *californicus* includes *verniculatus* and *sculptilis*, as well as several intraspecific forms that have escaped description.

EXPLANATION OF PLATE VI.

Omus cupreonitens n. sp. Fig. 1, male type, humeri moderate and rounded; Fig. 2, female type, humeri broadly rounded; Fig. 3, male, an intraspecific variation, humeri obsolete; Fig. 4, an average female. Figs. 3 and 4 more highly magnified than Figs. 1 and 2.

Entomology at the United States National Museum.*

By T. D. A. COCKERELL, Boulder, Colorado.

Several years ago, when going over the early correspondence of Spencer F. Baird at the Smithsonian Institution, I came across the following interesting letter, addressed to Dr. John L. LeConte, of Philadelphia:

November 20, '58.

DEAR JOHNNY:

You may as well return Vesey's bugs when done with, to be kept here with his other collections. I don't believe there is another specimen here which you have not seen from the western territories. I hope the new Entomological Circular we are about distributing will stir up the insects generally.

Yours ever,
S. F. BAIRD.

Vesey was John Xantus de Vesey, generally known in entomological literature as Xantus, who collected beetles, along with many other things, in Lower California. Dr. Horn (Proc. Calif. Acad. Sci., 1894) stated that the collections were made in 1859 and 1860, but we have evidence here that LeConte received specimens as early as 1858. Such species as *Cymatoderia xanti* Horn and *Pachybrachys xanti* Crotch commemorate the Xantusian labors in this direction.

*Read at the meeting of the Entomological Society of America, New York, December 27, 1916.

Further contributions from the western territories were described by LeConte in 1859, in his work on "The Coleoptera of Kansas and Eastern New Mexico," published by the Smithsonian Institution. Even in these early days it was recognized that the detailed facts were to be used synthetically, and the paper just mentioned contains a colored plate, illustrating the Entomological Provinces of North America.

A Catalog of the described Coleoptera of the United States, prepared by Melsheimer, and revised by Haldeman and LeConte, was published by the Smithsonian Institution in 1853. A new edition, by LeConte, appeared in 1863.

Other activities could be mentioned, but the above will suffice to recall the beginnings of entomology in the National Museum. Following the custom of the Smithsonian Institution, which is continued to this day, co-operation with students and institutions in various parts of the country was sought, and the then small resources were made to go as far as possible.

Thirty years later than Baird's letter to LeConte, I was in active correspondence with the Washington entomologists, at that time under the leadership of C. V. Riley. I recall my amazement at the kindness shown to an unknown student in the far West, at the numerous and valuable publications sent out free of charge. The story of American economic entomology has been told by Dr. Howard and others. Much of it is fresh in the minds of most of us, and it is not necessary to go into details. The point we are interested in at this moment is, that the great development of the practical side of entomology led to a corresponding development of its purely scientific aspects, of insect biology and classification. The National Museum, securing the co-operation of the Department of Agriculture, and depending on the staff of that Department, was able to build up a collection of first-class importance. Up to the present moment this dependence has continued, and comparatively little of the entomological activity in the Museum is under the jurisdiction of and supported by the Museum proper. This is not a unique situation but represents a common trend in American scientific affairs. Thus in the Museum a

large part of the work on fossils and molluscs is done by officials of the U. S. Geological Survey; in the universities and schools researches are carried on by those who are primarily paid to teach. It is a wise policy to interpret the laws governing economic activities liberally, so as to include, or at least permit, work which, though not directly economic, forms the basis of the designated undertakings.

Having visited the National Museum at intervals, dating back to the time when entomology occupied cramped quarters in the building, I have witnessed with pleasure and admiration the great developments which have taken place. These developments, however, have tended to increasingly tax the resources of the institution, and to-day it is impossible to keep all the collections in good order and up to date. Many of the men are so keenly interested that they work overtime, far into the night or on holidays; but in the nature of the case it is impossible for them to keep pace with the accessions and the developments of the science in all its ramifications. Being nearly all employed ostensibly as economic workers, working for the Department of Agriculture, injurious insects and correspondence relative to them naturally take precedence, and more purely scientific activities tend to be crowded to the wall.

Fully recognizing the necessity and wisdom of the form of development which has brought the entomological division of the Museum up to its present high standard, I venture to suggest that we must in the future, perhaps in the near future, pass to another stage of departmental evolution. Ideally, the Museum has functions resembling those of a library in many respects. It is the business of the curators, first of all, to arrange and classify the collections, and make them available to those who can use them to advantage. The Department of Agriculture has long ago developed its library facilities, instead of depending on the various workers to do library work. Even the Bureaus have their libraries. It would be entirely to the advantage of the Bureau of Entomology to have the care of the entomological collections taken off its hands, and assumed by the Museum. It would be advantageous to the Museum,

from the standpoint of administration, to have control under a unified system. There is no possible reason why, under such an arrangement, the economic workers should not have the fullest use of the materials, whenever they required them, and the Museum would of course continue to profit enormously by the labors of the Bureau men.

Under Museum administration, every phase of the science would receive consideration, and each group of insects would have its own museum curator. Great developments would follow, which could not very well occur under economic auspices, stretching the law to the utmost. For example, the Museum is extremely deficient in exotic insects, especially those of the Old World. There are of course large exotic collections, notably the neotropical Lepidoptera donated by Schaus; but when we come to compare the exotic collections as a whole with those of the British Museum, the comparison is humiliating.

Without going into further details, I venture to suggest the appointment of a committee of this society to inquire into the subject and report a year hence. The first question is naturally that of ways and means. It would be necessary to secure a suitable grant from Congress, and in order to do that, entomologists would be called upon to press the matter in as many places and at as many times as opportunity offered. This they could or would only do if convinced of the importance and justice of their cause. It is easy to say that no museum, in any part of the world, has yet been able to deal thoroughly with its entomological materials. Even the British Museum has cabinets full of accessions, sorted only down to the major groups. Yet it seems reasonable to urge that in view of the great and increasing importance of entomology, and in view of the position of the United States in the world, we ought certainly to bring our national entomological collections up to a standard which will fairly correspond with our great resources and reputation for intelligence.

I have recently had occasion to review certain phases of English nineteenth century history. It is curious to read to-day the discussions over the problem of popular education, held

at a time when church schools were endeavoring to cope with the education of the masses, without even appreciating the magnitude of their task. If some of the really great and good men who opposed public education could now come to life in the United States, and see the vast expenditure of money on universities and schools of all grades, they would indeed be amazed. What we take now as a matter of course and of necessity, would then have seemed ultra-chimerical. So, I believe, the support given to science in future days will compare with what we now regard as large expenditures. With faith and imagination there is no telling what developments may be possible.

Spiders in the Adirondacks (Araneina).

By J. H. EMERTON, Boston, Mass.

In August last I joined a party of entomologists from Cornell University in an exploring visit to the neighborhood of Mt. Whiteface in the Adirondacks of northern New York. A large variety of entomological specialties were represented and three of us, Prof. C. R. Crosby, Mr. S. C. Bishop and the writer, devoted ourselves to spiders. The party assembled during August 20th at Wilmington, twelve miles northeast of Lake Placid, and began the sweeping of bushes and turning over logs around the village. The following day Prof. Crosby and I went to Wilmington Notch and spent the day sweeping the roadside and sifting the leaf mold in the maple woods at an elevation of 1600 feet. Most of the spiders found are known in other parts of the State and in Vermont and New Hampshire. Among them are the following: *Ceratinella laetabilis*, *atriceps* and *brunnea*, *Caseola herbicola*, *Lophocarenum simplex* and *longitarsus*, *Microneta viaria* and *cornupalpis*, *Diplostyla brevis*, *Bathyphantes zebra*, *Cicurina brevis* and *Cryphoea montana*. In the bushes were *Theridion montanum* and *aurantium*, *Drapetisca socialis*, *Epeira angulata* and *corticaria*, *Hyptiotes cavatus*.

On the third day we went up Mt. Whiteface. The lower part of the mountain has been cut and burned and we did nothing until we reached the spruce forest at a height of 3000

feet, and here as in the White Mountains we found *Linyphia nearctica* on the small spruce and balsam trees and with it the more widely diffused *Theridion montanum*, and nearer the ground *Theridion sexpunctatum*. At about 4000 feet we spent much time sifting the moss which grows thickly on the decaying stumps, and the species here were the same as at a similar elevation in the White Mountains—*Theridion sexpunctatum*, *Pedanostelus fuscus*, *Lophocarenum castaneum*, *Lophocarenum (Tmeticus) armatus*, *Tmeticus montanus*, *bidentatus* and *truncatus*, *Amaurobius tibialis* and *Gnaphosa brumalis*. The rarer *Tmeticus microtarsus* and *Nematogmus drassoides* were also found. Above the trees at 4500 feet were *Pardosa unicolor*, *muscicola* and *luteola*. We camped two nights on the mountain and continued collecting near the summit and on the way down. Another day was spent at Wilmington along the lumber roads east of Mt. Whiteface, ascending gradually from 1000 feet at the village to 2500 feet in the undisturbed forest on the northern side of the mountain. The way passed first through open and partly cultivated country and here we found such familiar spiders as *Theridion differens* and *murarium*, *Linyphia phrygiana*, *marginata* and *variabilis*, *Helophora insignis*, *Pardosa tachypoda* and *Dendryphantes flavipedes*. In the clearing at the highest part of the road were *Theridion montanum*, *Linyphia nearctica*, *Diplostyla nigrina*, *Amaurobius borealis* and *Liocranum calcaratum*.

After leaving Wilmington we spent a day at Saranac on the boggy shores of one of the ponds. Here were *Epeira strix*, *corticaria* and *prompta*, the two species of *Argiope*, *Singa variabilis*, *Tetragnatha (Eucta) caudata* and *Sittacus palustris*. The black and white bog variety of *Epeira labyrinthica* also occurred on low plants around the edge of the bog, several having, as in the bogs in Maine, large conical nests containing the cocoons of eggs. Throughout the trip search was made, in the small conifers, for *Theridion zelotypum*, which extends across Canada as far south as Sherbrooke and Ottawa, but it was not found. Altogether 110 species of spiders were collected, six of which need further study and may be described as new.

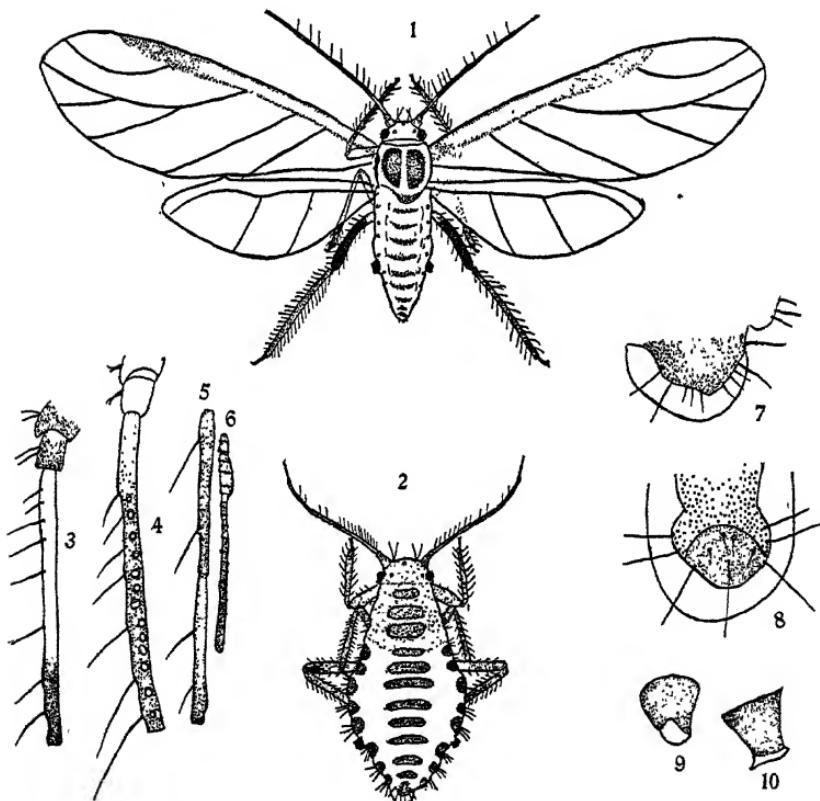
New Aphids from California (Hem., Hom.).

By G. O. SHINJI, Berkeley, California.

(Plate VII)

Thomasia californiensis n. sp.

Alate viviparous female.—General color orange to salmon-red. Length of body excluding style, 2.6 mm.; greatest width of abdomen, 1.2 mm. Wing expansion, 5 mm. Head broader than long, dusky. Eyes red, prominent. Beak short, dusky, not reaching the second coxa as in apterous forms. Antenna dusky except yellowish basal part of



Figs. 1-10, *Thomasia californiensis* n. sp. 1, winged viviparous female; 2, apterous viviparous female; 3, first, second and third joints of the antenna of apterous viviparous female; 4, 5, 6, the antennal joints of the adult alate viviparous female; 7, cauda of the apterous form; 8, cauda of the alate individual; 9, cornicle of the alate female; 10, cauda of the apterous viviparous female.

III, provided with rather few, but very long, bristle-like hairs; III with about 18 circular sensoria. Length of antennal joints: III, .6 mm.; IV, .5 mm.; V, .3 mm.; VI, .2 mm.; spur or filament, .4 mm. Prothorax wider than long, dusky. Meso- and metathorax also dusky. Middle and hind legs black except orange basal one-third of the femur. Basal one-half of femora and tibia of the front leg orange, the remaining part dusky. Length of femora: front, 1.3 mm.; middle, 1.1 mm.; hind, 1.7 mm. Abdomen of red-salmon color, with dark dorsal bands. Hairy throughout body. Cornicle black, wider at base than at apex. Style black with a few long hairs.

Apterous viviparous female.—General color salmon-red to orange. Length of body, 2.8 mm. Greatest width of abdomen, 1.6 mm. Head the color of body, broader than long. Beak beyond the second coxal cavity, tip dusky, remaining part salmon-red. Antenna shorter than body; article III, salmon-red, provided with bristle-like hairs on a row facing outside; IV and V, mostly dusky, but with a smaller number of bristles each; VI, including filament, dusky. Length of antennal joints: III, .7 mm.; IV, .4 mm.; V, .3 mm.; VI, .2 mm.; filament, .4 mm. Prothorax slightly dusky, wider than broad. Meso- and metathorax also slightly dusky. Abdomen salmon-red, with a black, transverse band on each of the segments. Cornicles black, base decidedly wider than at the apex. Style dusky, somewhat rounded and provided with hairs. Legs slightly dusky, except at the joints.

Host plant—*Acer macrophylla*.

Locality—University of California campus, Berkeley, California.

Date of Collection—April 5, 1915.

Types at the University of California.

Myzocalis essigi n. sp.

Alate viviparous female. General color pale. Length of body, exclusive of style, 1.65 mm. Greatest width of abdomen .65 mm. Wing expansion 2.3 mm. Head broader than long, pale, width between the eyes .25 mm. Tip of beak slightly dusky. Antenna pale except at the joints of III, IV, V and most of VI including spur which are dusky. Length of antennal joints: III .6 mm, IV .4 mm, V .3 mm, VI .2 mm, filament .19 mm. Article III with 6 to 7 circular sensoria. Prothorax pale, .5 mm. long and .32 mm. wide. Mesothorax pale, width .55 mm. Metathorax also pale. Legs pale except dusky tarsi with claws. Abdomen pale with 4 large, long, blunt tubercles on first and second segments. Cornicles black, somewhat constricted near the middle. Style distinctly constricted, pale. Anal plate deeply and beautifully bifurcated, pale. Wings hyaline.

Nymphs are beautifully shaded with green and pale.

Locality—University of California campus, Berkeley, California. Date of collection, April 5, 1915, and also June 15, 1916. Host plant—*Quercus* sp.

Note.—Absence of any dusky spots about the thorax and dusky color of the cornicle distinguish this species from its relatives, such as *M. discolor*, *M. bellus*, *M. quercifolia* and others.

This species is named after Professor Essig, who has encouraged and in many ways helped the writer in the study of this group of insects.

***Myzocalis woodworthi* n. sp. (Plate VII).**

Alate virgiparous female. General color light green. Length of body excluding cauda 1.2 mm. Greatest width of abdomen .5 mm. Wing expansion 3.1 mm. Head broader than long, width, including eyes, .35 mm., pale. Tip of beak slightly dusky. Antenna dusky. Length of articles: III .55 mm., IV .4 mm., V .3 mm., VI .2 mm., spur, 2 mm. Number of sensoria on antennal joints: III, 28; IV, 14; V, 12; VI, 4. Prothorax nearly as wide as head, width, .5 mm., length, .3 mm., pale. Mesothorax and metathorax pale with muscle lobes amber. Mesothorax with a pair of large spines. Width of mesothorax .4 mm. Femora and tibia pale, tarsi dusky. Abdomen pale, with dusky dorsal bands. Bands or markings of this species fade somewhat in mounted specimens. Dorsal tubercles on the first and second abdominal segments present as in *M. essigi*. Cornicles dusky, about .13 mm. long. Style constricted at base. Anal plate distinctly and deeply bifurcated.

Nymphs with checkered dorsal marking on the abdomen as in *M. essigi*, *M. maurei* and *M. passani*.

Locality—University of California campus, Berkeley, California. Date of collection—June 20, 1916. Host plant—*Quercus* sp.

This beautiful aphid is named in honor of Professor Woodworth, of the University of California, with whom the writer has enjoyed studying for more than eight college years.

What seems to me *M. hyalinus* Mon. has been recently collected by the writer in this locality, although the spur is almost subequal to the base; it may be a local variation. The writer has never had an opportunity of seeing any true form of *M. hyalinus*. This species agrees with Monell's description in several points.

Myzocalis hyalinus Mon. (?).

Alate viviparous female. General color pale. Length of body exclusive of style 3.2 mm. Wing expansion 3.5 mm. Head pale, width between the eyes .3 mm. Eyes prominent, black. Beak short, tip slightly dusky and lying between the first and the second coxa. Antenna pale except dusky rings near the joints of III, IV, V and VI including spur. Article III provided with about 6 large circular sensoria near the base. Prothorax pale, smallest width .4 mm., greatest width, which is nearer to mesothorax, .7 mm., length .4 mm. Mesothorax pale, with muscle lobes orange; width, .95 mm. Legs with dusky spot at the base of tibia, tarsi dusky, rest pale. Abdomen pale, very much inflated. Cornicles pale, slightly longer than wide at base, somewhat constricted at middle, length about .1 mm. Style pale, tip rounded, with spines about .25 mm. long. Anal plate pale, deeply bilobed, provided with long spines.

Nymphs.—As far as the writer's observations go, nymphs of this species were not shaded with green as in the case of related species.

Locality—University of California campus, Berkeley, California. Latest date of collection—July 28, 1916. Host—*Quercus* sp.

The writer has had opportunities to examine several hundreds of Aphid species, but never observed such a numerical variation as presented in this species. The following measurements obtained with specimens collected on the same day at one and the same niche will illustrate this statement:

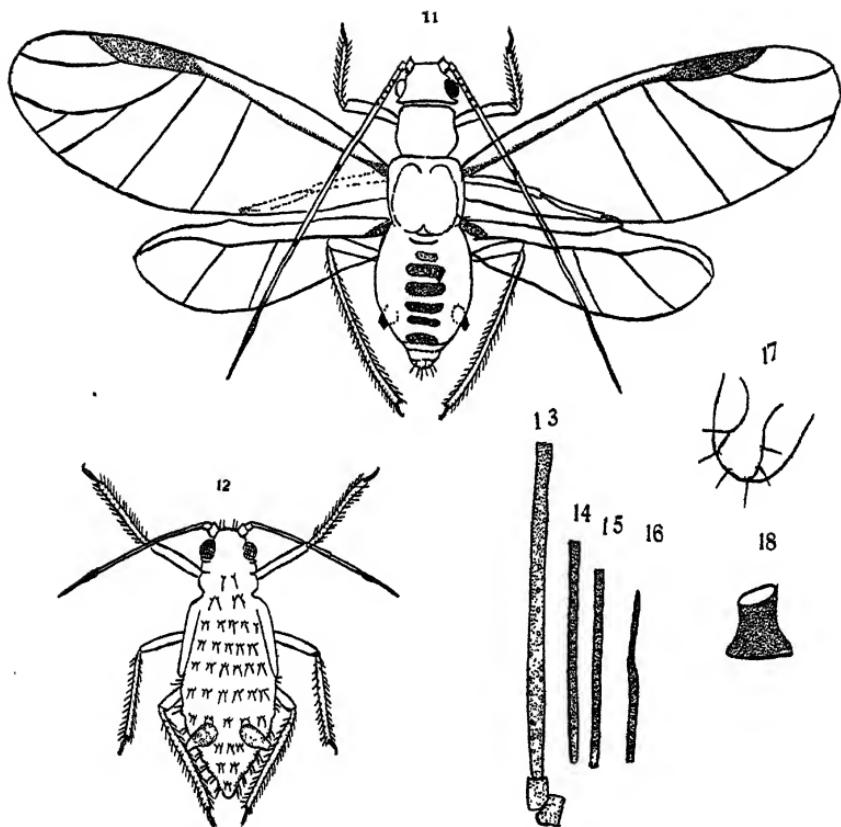
Numerical variation in *M. hyalinus* Mon. in millimeters.

Specimen	No. 1	No. 2	No. 3	No. 4
Length of body including style.....	3.7	2.9	2.4	1.75
Width of abdomen	1.4	1.3	.9	.8
Wing expansion	3.5	3.6	3.2	3.5
Length of antennal joint III.....	.95	.9	1.	.8
Length of antennal joint IV.....	.7	.9	.8	.6
Length of antennal joint V.....	.6	.75	.6	.5
Length of antennal joint VI.....	.27	.35	.25	.29
Filament .....	.27	.40	.25	.23

Thus in my specimen the spur is not absolutely longer than the base. I am not as yet sure whether this is true *hyalinus* Monell or not.

EXPLANATION OF PLATE VII.

Figs. 11 to 18, *Myzocalis woodworthi* n. sp. 11, Alate viviparous female; 12, nymph; 13 to 16, the antennal articles of the alate viviparous female; 17, cauda, 18, cornicle of the alate viviparous female.



MYZOCALIS WOODWORTHI—SHINJI.

New York Scolopostethi (Family Lygaeidae: Heter.).

By J. R. DE LA TORRE-BUENO, White Plains, New York.

SCOLOPOSTETHUS Fieber

Fieber, 1861, Eur. Hem. 66 and 188; Horv. 1893, Rev. d'Ent. 238.

The genus *Scolopostethus* of the family *Lygaeidae* was established by Fieber in his *Europäischen Hemiptera*, in the dichotomy. In the specific keys it was further defined and six species were separated. It belongs in the subfamily *Rhyparochrominae* (Stål), V. D. Check List, or *Aphaninae* of the European authors; and to the tribe *Lethiini* (Stål) V. D. (recte *Lethaeiini*), or *Drymini* of the Europeans, and follows our southwestern genus *Esuris* Stål in the lists, or *Cryphula* Stål in our local fauna, being the last of the family *Lygaeidae* in Van Duzee's arrangement. This, by the bye, differs markedly from Oshanin and other European authorities, in whose arrangement it follows *Eremocoris*, its most similar neighbor.

The *Lygaeidae* (or *Myodochidae*) form a very extensive family, being the third in number of species after the *Miridae* and the *Pentatomidae*, in this order. All have a very distinctive aspect, from the gaily colored species of *Lygaeus* to the gray and sober *Nysius*. They fall into a number of well-defined divisions recognized as subfamilies and tribes. The *Aphaninae* (*Pachymerinae*, *Rhyparochrominae*) are distinguished by having the sutures of the second and third abdominal segments more or less curved toward the connexivum which they do not reach, a sharp character separating them from all other subfamilies. The *Lethaeiini* are separated from the remaining tribes of the subfamily by having no regular lateral lamellar pronotal expansion except at the middle, and the pronotum much narrowed anteriorly.

In *Scolopostethus* the head is triangular, anteriorly acuminate, the first antennal joint going beyond its apex; the eyes do not quite touch the pronotum; the rostrum reaches the intermediate coxae, the pronotum is trapezoidal, sometimes nearly square, depending on the wing development; the lateral margins sinuate, laminate; the incrassate anterior femora have a

single long spine, followed by a series of shorter ones at least to its base and sometimes to its apex.

Its chief characters are: the rostrum not going beyond the intermediate coxae and the first joint of the antennae not projecting beyond the head by more than half its length, which distinguishes it from its most similar neighbor, *Eremocoris*. It is separated on the other hand from *Drymus* by the nearly parallel body and the pronotum not so markedly trapezoid, it being strongly so in the latter.

On recorded distribution, *Scolopostethus* is essentially palaeoarctic, 12 of its 16 species being peculiar to that region, of which 11 are found in Europe. Of the remaining species, 2 are American or Nearctic; 1 Maorian, from New Zealand, and 2 Oriental, from China and India. It is unwise, however, to place much reliance on this distribution, since the species are smaller members of an inconspicuous group little collected anywhere, except in Europe, where entomologists abound and where collecting has been most intensive.

Four species are known from the United States—*Scolopostethus thomsoni*, also European and described thence; *S. atlanticus* and *S. diffidens*, described in 1893 by Horvath from the United States; and *S. tropicus*, described by Distant in 1882 from Guatemala (as *Eremocoris*), and recorded by Van Duzee from "Pacif." thereby meaning California, etc.; Gillette and Baker, in *Hemiptera of Colorado*, record it thence.

No species of the genus was known from America, North or South, until Mr. E. P. Van Duzee recorded *S. affinis* from the United States. In 1893 Horvath described *S. atlanticus* and *S. diffidens* in the *Revue d'Entomologie*, in his paper on American Scolopostethi, "Les *Scolopostethus americains*," in which he also noted the occurrence of the European *S. thomsoni* Reuter, 1875, on both sides of the Atlantic, and that *S. affinis* was European only, so far as known. Our species are separable by the following key:

- i (2)—Two erect hairs *near* ocelli; anterior femora with one large spine near middle, with smaller spines running from it to both ends *S. thomsoni* Reut.

2 (1)—Without hairs near ocelli; anterior femora spined only toward apex from large spine.

3 (4)—Membrane grey; clavus with three rows of punctures,

S. atlanticus Horvath.

4 (3)—Membrane dark brown, marked with white; clavus with four rows of punctures, basally confused *S. diffidens* Horvath.

Scolopostethus thomsoni Reuter (1875, Ann. S. E. F., 562) is a widespread species through Europe. With us it has been recorded by Horvath from Canada and California, and later by Barber in *Insects of New Jersey* (Smith), from Roselle Park, New Jersey, taken by sifting. In his *Hemiptera of Buffalo*, Van Duzee states it is not uncommon among moss and rubbish in fence rows; long- and short-winged forms were found hibernating together, in company with *Blissus leucopterus*; the young occurred in July. It is also known from Alaska.

Scolopostethus atlanticus Horvath (1893, op. c. 239) is seemingly the most abundant species about New York. Horvath recorded it from Massachusetts and New Jersey. In *Journal New York Entomological Society* it was recorded from White Plains, from clumps of tussock grass or sedge, at the base, in May, June and July. My last catch was in June of last year, when I collected 54 by sweeping the tussock sedge growing in a marshy spot. These individuals came from the flowers or seeds at that time, however. In May I also took it under a board on a dike running through a marsh or swale. The species is to be found overwhelmingly in the short-winged form; out of some 80 before me only five are fully winged. It also seems particularly prone to defective antennae, three specimens having three joints only on one or the other antenna, and one has both antennae 3-jointed. It seems that Costa founded his genus *Tritomacera* on such a defective specimen, and it may be that we shall eventually call the genus under discussion by this name.

I received this species from Colorado under the name *Scoloposcelis discoidalis*, a member of the family Anthocoridae. New Mexico (Ft. Wingate) and Newfoundland (East Coast) are new records *ex* my collection.

Scolopostethus diffidens Horvath (1893, op. c. 240) is re-

corded by him from Massachusetts and California; Barber has found it in New Jersey (Lakehurst); and I took it in Amherst, Mass., one long-winged and one short-, under leaves in May.

Very little indeed is known of these insects with us, so that it may not be amiss to note here the habits of the more collected and better known European species.

Scolopostethus pictus, according to Puton, is found in ants' nests; Fieber states it is found under fallen leaves, under plants on grassy mounds on dikes; Guérin and Péneau find it on lake shores in July, on willow; Saunders took it in the English Fens.

S. affinis Schilling, Saunders reports as common in rubbish and as taken by sweeping nettles in summer; Douglas and Scott say it is very common, especially under heath, nearly all the year through; Guérin and Péneau find it common all year, in summer in the fields, on divers plants, in winter under moss; Fieber records it on dry stony mounds, under *Erica* (heath).

These are typical of the habit of the other species; all seem to be found under leaves or near damp places or on dry fields, some, indeed, in all three habitats.

A New Genus and Species of Buprestidae (Col.).

By H. C. FALL, Pasadena, California.

AMPHEREMUS. New genus.

Body narrow, subcylindric, mentum very strongly transverse, arcuate anteriorly; labrum short, bilobed; epistoma broadly sinuate. Antennal cavities rather large, separated by slightly more than one-third the total width between the eyes, upper margins oblique and slightly reflexed. Eyes moderate, their inner margins nearly parallel. Terminal joint of maxillary palpi widest at base, feebly conical, a little compressed, apex truncate, preceding joints obconic, as wide as long. Antennae short, rather thick, serriform from the fourth joint, the serriform joints densely finely punctate and opaque inferiorly and apparently with very small intro-terminal sensory fossae.

Prothorax cylindrical, not margined at sides except for a very short distance at the base angles; base with a short, broad, sinuate, feebly reflexed lobe. Scutellum very short and broad, scarcely entering the elytral disc, its posterior margin broadly arcuate. Elytra narrow, parallel, a little wider than the thorax, side margins not serrulate. Prosternum broadly convex, more strongly so between the coxae, squarely truncate in front, intercoxal process slightly dilated behind the coxae, then gradually pointed. Mesosternum deeply impressed or divided throughout its length, the impression or excavation occupied anteriorly by the tip of the prosternum, but open for a short distance posteriorly. Front coxae separated by about their own widths; middle coxae slightly more distant. Metasternal episterna moderately wide, about two and one-half times as long as wide. Hind coxal plates not much dilated internally, the posterior margin concave and only a little oblique.

Ventral segments 2-4 equal, first conspicuously and fifth slightly longer, sutures straight, the first fine but distinctly impressed.

Legs moderate, tarsi subequal in length to the tibiae, basal joint distinctly longer than the second, joints 1-4 lobed beneath; claws simple.

A. cylindricollis n. sp.

Cylindrical, convex, viridi-aeneous, elytra distinctly cuprascent, clothed thinly above and beneath with fine whitish pubescence, the hairs inclined on the elytra, a little longer and erect on the head and prothorax.

Head exactly equal in width to the prothorax, front convex, densely punctate and with two very small tuberculiform prominences at middle, between which is a slight impression. Antennae equal in length to the prothorax and attaining the middle of the latter; joints 1 and 3 moderately elongate, 2 and 4 shorter, 4 triangular, as long as wide, 5 to 11 transverse, their lower edges feebly oblique to base.

Prothorax cylindrical, a little wider than long, sides straight and parallel from base to apex, disk a little more strongly convex antero-medially, and with a short ante-median impression; surface nearly evenly punctate, the punctures separated by their own diameters or rather more, the interstices polished; hind angles not in the least carinate. Elytra a little wider than the thorax, parallel to apical third, apex obtusely rounded or subtruncate, surface rather densely punctate and vaguely finely striate, the punctures of the intervals similar to and much confused with those of the striae. Beneath rather closely punctate and

finely pubescent, the punctures coarser at the middle of the prosternum, somewhat denser at the sides of the body, the posterior margins of ventral segments 2 to 5 smooth at middle; last segment subtruncate at apex. Length 6.75 mm.; width 2 mm.

Described from a unique example of unknown sex taken by Mr. J. O. Martin at Palm Springs, California. *Type* in my collection.

The generic affinities of this rather remarkable species are not readily determinable by means of the table of tribal divisions as given in the LeConte and Horn Classification. The form is as slender as in many Agrili and the front may fairly be said to be contracted by the antennal cavities, yet the general facies and most essential characters absolutely forbid this reference. After a somewhat careful comparative study I am pretty well convinced that its place is between the group Chalcophorae and Buprestes as now limited, and its nearest ally is perhaps the recently described *Nanularia** of Casey, with which it seems to agree closely in antennal formation, and substantially in several other respects. The mesosternum and metasternum do not appear to be ankylosed between the coxae, neither is there apparent so distinct a cleft as in *Nanularia*. The palpi are unlike those of any of the genera of the Chalcophorae or Buprestes and resemble more nearly the form in *Acmaeodera*. The punctuation is suggestive of *Hippomelas*, though not quite the same. The perfectly parallel-sided thorax with the merest vestige of a lateral margin at the extreme base is quite unique among our Buprestidae.

Return of Animal Life to the Katmai District, Alaska.

In the course of studies of the revegetation of the district devastated by the eruption of Katmai, under the auspices of the National Geographic Society, some observations have been made on the return of animal life. The striking thing is that predaceous animals are returning before the return of herbivorous types. This is true of both mammals and insects. The area near the volcano was practically devoid of insect life three years after the eruption (1915), but was fairly swarming with insects the year following. Most of these were predaceous, parasitic or coprophilous. The origin of these insects, their breeding places, and the reason for their sudden appearance are mysteries. They were ravenously hungry and many were dying from starvation.—ROBERT F. GRIGGS, Ohio State University (in Program of the Ecological Society of America, Dec. 27-29, 1916).

*Proc. Wash. Acad. Sci. XI, p. 172, 1909.

A New Catocala Net.

By J. C. HUGUENIN, San Francisco, California.

Collectors of *Catocala* will undoubtedly be interested in a new net for their special use. My experience and difficulty in gathering these moths is, no doubt, shared by others, and I determined on perfecting a net that would obviate many difficulties and preclude the possibility of losing a good specimen.

As all *Catocala*-collectors are aware, many of these moths repose in crevices in bark quite out of reach of the collector. With the serrated rubber edge (*D* in the diagram) the obstacle offered by the breach in the bark, which provided a refuge for the moth, can be overcome. The flexible teeth of the net *D* enter all the uneven surfaces of the bark and a slight movement of the net is sufficient to cause the moth to fly. The teeth prevent the moth escaping along the crevices in the bark. The alternative is flight, and in so doing the moth enters the cyanide bottle through the paper funnel *B* where, owing to the peculiar construction, escape is impossible.

The maker of this net has been able to catch *Catocalae* without effort at a height of 12 to 14 feet from the ground.

The figure on the following page shows the construction of the net so that only a few words are necessary in explanation.

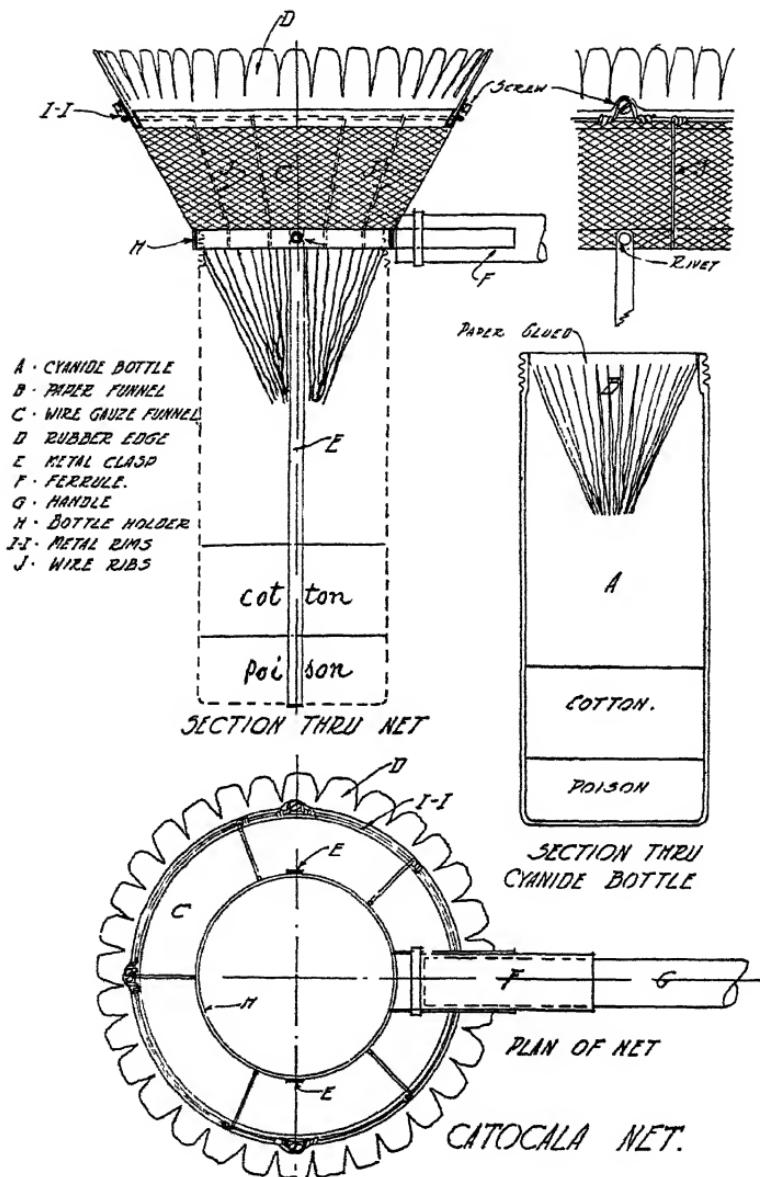
A—cyanide bottle $2\frac{1}{2}$ x 5 inches showing the position and style of paper funnel *B*.

B—Paper funnel made of light, stiff paper; the funnel is glued to the interior of the cyanide bottle at the mouth.

C—Light wire screen funnel through which the actions of moth can be observed.

D—Metal net frame, 6 inches in diameter, with serrated edge made of rubber, one and a half inch wide, teeth cut so that they will be about one inch long.

E—Light metal (galvanized iron) clasp entirely surrounding the bottle to hold the bottle rigidly against the net.



Drawings illustrating A New Catocala Net, described on page 71.

New Indian Gall Midges (Diptera).

By E. P. FELT, Albany, New York.

In an endeavor to discover plants in which *Pachydiplosis oryzae* Wood-Mason might breed in the absence of paddy (rice), various grasses bearing deformations similar to those produced by the above named midge were found on three different grasses by Mr. Y. Ramachandra Rao and a number of flies bred out and submitted for study through Prof. T. V. Ramakrishna, Government Entomologist of the Agricultural College and Research Institute. Several new species obtained are described below and it is worthy of note that *Orscolia cynodontis* Kieff. & Mass. was reared not only from *Cynodon dactylon* but is also recorded as issuing in association with *Pseudhormomyia fluviialis* and *Lasioptera fluitans*, both characterized below. In addition, females of another species were obtained and it is probable that further rearings would result in the securing of other gall midges.

Lasioptera fluitans n. sp.

The specimens were received from T. V. Ramakrishna, Government Entomologist, Coimbatore, India, under date of August 4, 1916, accompanied by the statement that they were reared from galls in *Panicum fluitans* along with *Pseudhormomyia fluviialis* described below. The specimens were labeled 3, XII, '15, South India, Coimbatore, from *Panicum fluitans*, Y. R. Coll.

♀. Length 1.5 mm. Antennae extending to the base of the abdomen, sparsely haired, dark brown; 18 segments, the fifth with a length equal to its diameter, the terminal segment narrowly to broadly oval; face with a conspicuous patch of white scales. Palpi yellowish, the first segment irregularly subquadrate, the second with a length nearly twice its diameter, the third a little longer than the second, more slender, and the fourth a little longer and more slender than the third. Mesonotum a shining dark brown. Scutellum dark reddish brown apically, yellowish basally, postscutellum dark brown. Abdomen almost black, with lunate submedian silvery spots on segments 1 to 5, the apex of the terminal segment yellowish. Wings hyaline, costa dark brown, the third vein uniting with the yellowish costal spot at the distal third; halteres mostly pale yellowish orange; coxae and femora basally yellowish orange, the

distal portion of femora, tibiae and tarsi a nearly uniform dark brown. Ovipositor nearly as long as the abdomen, a thick group of moderately stout, hooked spines at the base of the slender, sparsely setose, tapering lobes, the latter with a length nearly three times the width.

♂. Length 1.5 mm. Antennae dark brown, sparsely haired, extending to the base of the abdomen, the fifth with a length one-fourth greater than its diameter, the terminal segment narrowly oval. Palpi: first segment subquadrate, the second with a length twice its diameter, broader, the third a little longer and more slender and the fourth a little longer and more slender than the third. Colorational characters wanting; claws moderately stout, strongly curved, unidentate, the pulvilli as long as the claws. Genitalia: basal clasp segment rather short, stout; terminal clasp segment long, swollen basally, subacute apically; dorsal plate short, broad, deeply and triangularly emarginate, the lobes narrowly rounded distally; ventral plate long and tapering to a narrowly rounded apex; harpes long, stout, tapering apically, with an irregular quadrate tooth; style long, slender, narrowly rounded distally.

Type Cecid. a2779.

Pseudohormomyia fluvialis n. sp.

The midge described below is provisionally referred to this genus and was received from T. V. Ramakrishna, Government Entomologist, Coimbatore, India, under date of August 4th, 1916. The species is stated by him to be very abundant locally, breeding on *Panicum fluitans*, a common grass in wet land areas, galls being found both in the terminal and the side shoots. The specimens were labeled No. 1, 29, VII, '16, South India, Coimbatore, from *Panicum fluitans*, Y. R. Rao Coll.

♂. Length 3 mm. Antennae one-half longer than the body, rather thickly haired, yellowish brown; 14 segments, the fifth with the stems approximately equal, each with a length one-half greater than the diameter; the basal enlargement subglobose, the distal pyriform and with a constriction near the middle, each enlargement with a whorl of long, stout setae, the basal with one and the distal with two circumfili, the loops moderately long and thick; terminal segment with the basal portion of the stem produced with a length five times its diameter, the distal enlargement shaped like a truncate cone, the length one-half greater than its diameter and apically with an equally long, moderately stout, fusiform appendage. Palpi: first segment subquadrate, the second narrowly oval, with a length nearly twice its diameter, the third twice the length of the second, slender. Mesonotum purloish brown, the submedian lines sparsely haired. Scutellum and postscutellum

yellowish brown. Abdomen rather thickly haired, purplish brown, the genitalia yellowish. Wings hyaline, the third vein uniting with the margin well beyond the apex; halteres yellowish basally, yellowish brown apically; anterior coxae dark brown, the mid and hind coxae yellowish brown; legs a nearly uniform yellowish brown, the hind tarsal segments yellowish straw; claws moderately stout, strongly curved, simple, the pulvilli as long as the claws. Genitalia: basal clasp segment moderately stout and unusually long, the length being nearly three times the greater diameter and with an obtuse internal lobe near the basal half; terminal clasp segment stout, slightly curved and with a length about thrice its diameter; dorsal plate nearly divided, the lobes long and tapering to a narrowly rounded apex; ventral plate long, broad, constricted near the distal third and broadly rounded apically; style long, slender.

♀. Length 3 mm. Antennae nearly as long as the body, sparsely haired, light brown; 14 subcylindrical segments, the fifth with a stem one-fifth the length of the subcylindrical basal enlargement, which latter has a length five times its diameter, a distinct constriction near the basal third, whorls of long, stout setae basally and subapically and short-looped, circumfili near the basal third and apically, the latter connected by a longitudinal filum; terminal segment reduced, tapering slightly distally, with a length about four times its diameter and apically a short, stout, subfusciform appendage. Palpi: first segment broadly oval, the second a little longer, more slender, and the third more than twice the length of the second and more slender. Mesonotum dark reddish brown to dark brown, the submedian lines almost naked. Scutellum and postscutellum yellowish brown, the abdomen sparsely haired, reddish brown, the segments narrowly margined posteriorly with yellowish brown, the eighth and ninth mostly yellowish brown. Wings hyaline; halteres mostly yellowish brown. Coxae yellowish brown, the legs mostly a chestnut brown; claws more slender than in the male. Ovipositor short, stout, the lobes broad, with a length about twice the diameter and tapering slightly to a narrowly rounded apex. Other characters practically as in the opposite sex.

Exuviae. Length 5.5 mm., mostly light yellowish brown; antennal horns long, narrowly conical; antennal cases extending to the base of the abdomen, the wing cases to the second abdominal segment and the leg cases of the first, second and third pairs extending to the third, fourth and fifth abdominal segments, respectively; the dorsum of each abdominal segment with a transverse, irregular row of stout, chitinous, unidentate spines, the anterior ones approximately half the size of the posterior series.

Type Cecid. a2777.

Pseudhormomyia cornea n. sp.

The midges provisionally referred to this genus were received from T. V. Ramakrishna, Government Entomologist, Coimbatore, India, under date of August 4th, 1916, accompanied by the statement that they breed in a grass, *Ischaemum ciliare*, the galls being formed mostly in the side shoots, and labeled No. 4, 2, VIII, '16, South India, Coimbatore, from *Ischaemum ciliare*, Y. R. Rao Coll.

♂. Length 2.5 mm. Antennae nearly as long as the body, sparsely haired, light brown; 14 segments, the fifth having the stems each with a length one-half greater than the diameter, the basal enlargement subglobose, the distal strongly constricted and with a length over twice its diameter; whorls of moderately stout setae occur upon both enlargements and on the distal two circumfili, the loops being moderately long, stout, and rather numerous. Palpi: first segment irregular, subquadrate, the second irregularly oval, the third more than twice the length of the second, more slender. Mesonotum reddish brown. Scutellum and postscutellum yellowish brown. Abdomen yellowish brown, the genitalia yellowish. Wings hyaline, the third vein uniting with the margin well beyond the apex; halteres yellowish. Legs mostly yellowish brown. Genitalia: basal clasp segment with a length two and one-half times its diameter and a distinct internal lobe near the basal half; terminal clasp segment stout, curved and with a length over twice its diameter; dorsal plate long, broad, deeply and triangularly emarginate, the lobes tapering mostly internally to a narrowly rounded, thickly setose apex; ventral plate long, broad, thickly setose; posterior margin narrowly rounded; style stout, tapering to a narrowly rounded apex.

♀. Length 3 mm. Antennae nearly as long as the body, thickly haired, yellowish brown; 14 segments, the fifth with a stem one-third the length of the cylindrical basal enlargement, which latter has a length about four times its diameter; low circumfili occur at the basal third and apically; terminal segment with the basal part subcylindric and having a length four times its diameter; apically there is an irregular, fusiform appendage about half the length of the basal portion. Palpi: first segment irregularly quadrate, the second as long as the first and the third twice the length of the second, slender. Mesonotum dark reddish, the submedian lines sparsely haired. Scutellum and postscutellum dark yellowish brown. Abdomen rather thickly haired, pale reddish, the terminal segments and ovipositor mostly yellowish; halteres mostly pale straw; coxae and legs mostly dark straw; claws moderately slender, strongly curved, simple, the pulvilli as long as the claws. Ovipositor short, moderately stout, the lobes sparsely haired, narrowly oval and with a length two and one-half times the width.

Type Cecid. a2778.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., FEBRUARY, 1917.

The Convocation Week Meetings—A Retrospect.

All expected a series of large meetings at New York City during Convocation week, and expectations were fully realized. We have no figures showing the number of persons present at the sessions of the various societies, but elsewhere in this issue, page 88, we give a list of the titles of papers presented and some statistics for comparison with those of previous years. It is always the case that some papers are merely read by title, but there seems to be no reason to think that a proportionally greater number of authors and speakers were absent when their names were called at New York than at other places in previous years. The total number of papers of entomological bearing is 139 as compared with the highest earlier total of 96 for the Philadelphia meeting of Convocation week, 1914. *Floreat Entomologia!*

On the social side are to be mentioned the common headquarters of the Entomological Society of America and the American Association of Economic Entomologists at the Hotel Endicott, enabling many entomologists to meet each other outside of the meetings, and conveniently situated for visiting the collections of the American Museum of Natural History. On Wednesday evening, December 27, the visiting entomologists were pleasantly entertained at supper, at the Museum, under the care of Dr. F. E. Lutz and the Entomological Societies of New York and Brooklyn. Following came the annual address of the Entomological Society of America, given in the same Museum by Professor T. D. A. Cockerell. His excellent resumé on "Fossil Insects" presented valid reasons why this field of entomology should be cultivated to a much greater

degree than has ever yet been the case. This evening closed with an enjoyable smoker to visiting naturalists at the Aquarium, offered by the New York Zoological Society. There was the usual dinner of the American Society of Naturalists on Friday evening, December 29, at which Dr. Raymond Pearl gave an illuminating presidential address on the present status of natural selection. The same society held a session on Saturday morning, December 30, at Cold Spring Harbor, Long Island, and afterwards inspected the Eugenics Record Office and the Carnegie Station for Experimental Evolution, under the kind attention and hospitality of Dr. and Mrs. C. B. Davenport, Drs. Blaikslie, Harris, Riddle, Banta and their associates.

The annual question of arrangement of the meetings of the Entomological Society and of the Economic Entomologists so that there shall be no important conflict between the interests of the two bodies came up again, accentuated by the large increase in papers on the Economic program. Hitherto, the programs of the two bodies have not overlapped to any great degree. It does not seem possible to maintain this condition of affairs any longer and one suggestion (which, we believe, we received from Dr. W. Riley), that the Section of Horticultural Inspection meet at the same hours as the Entomological Society, seems to offer a partial and not very objectionable way of solving the difficulties of conflicting meetings.

Questions and Answers.

The News invites those having any entomological questions which they wish answered to send such in for publication under this heading, and also invites answers from its readers or others to these questions. Questions and replies should be as brief as possible and the Editors reserve the right not to publish any of either class which seem to them objectionable or inappropriate. Those sending in contributions to this department will please indicate whether they wish their names or merely one or more initials to appear in connection with their communications, but all such must be accompanied by the full name and address of the writer for the information of the editors.

QUESTION No. 4.—Can anyone advise me as to where I can have foreign specimens of Coleoptera, Lepidoptera and other orders of insects determined as to specific names? Most of my material is from Japan.—HARRY L. JOHNSON, So. Meriden, Conn.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS
OF THE GLOBE.

Erebis odora and its Larvae in Iowa (Lep.).

On July 31st, 1915, a female *Erebis odora* was found resting on a screen door a mile and a half east of this town (Nevada, Iowa). It was rubbed some, but not badly. We have the moth in our collection.

August 15th, 1916, we took another, a female also, three miles east of town where we were sugaring for *Catocala*. It had come to bait on an elm tree. This one was quite a fresh specimen. It was confined in a paper bag, and deposited over five hundred (500) eggs, which began hatching four days after being laid. The young larvae were offered leaves of *Cassia marilandica*, *C. chamaecrista*, Honey and Black locust, *Amorpha canescens*, *A. fruticosa* and Kentucky coffee tree. They refused all but the last named. About two dozen ate leaves of the coffee tree and lived until past second molt, when they all died. Perhaps they had gone too long without food before beginning to eat and were in a weakened condition. It was a great disappointment to lose them at this stage, for they were a very interesting young family. They resembled young *Catocala* larvae greatly.

The egg was small, round and a dull, dirty blue color. Two days after they were laid the young larvae showed through the shell, and two days later they hatched. When newly hatched the larvae were over a quarter of an inch long, very slender, and as lively as *Catocala ilia* larvae, which they resembled very much. Body color brown, with four tubercles to each segment. These tubercles were black and large, almost obscuring the body color and making the larvae look quite black. Head was large and black. Six days later they passed first molt, were light brown, and from each tubercle extended a long, fine, dark hair. The underside was light and had the dark spots characteristic of all *Catocala* larvae. A week later they molted the second time, and were about three-quarters of an inch long. Body color the same, with fine, dark, wavy longitudinal lines. The fine hairs which sprung from each tubercle were three-eighths of an inch long and were stiff enough to stand erect. Over the eighth abdominal segment the two dorsal tubercles were very pronounced. Head black and underside almost white, with large black spots. One day after passing second molt they all died.

Since taking the moth two years in succession, two weeks apart, in practically the same neighborhood, and securing fertile ova from one, we wonder—Are they breeding here?—O. F. and J. S. HISER, Nevada, Iowa.

Advances in Knowledge of Fossil Insects.

Our knowledge of the occurrence and distribution of insects in previous ages of the earth's history has been notably increased by a recent paper by Mr. R. J. Tillyard, Science Research Scholar in the University of Sydney, on "Mesozoic and Tertiary Insects of Queensland and New South Wales." (Queensland Geol. Surv. Publ. No. 253, Brisbane, 1916.) It deals with material collected during a number of years at Denmark Hill at Ipswich, Goodna near Ipswich, and St. Peter's, near Sydney, all in New South Wales and at Duaringa, Queensland. The Denmark Hill beds are referred to the Triassic, the St. Peter's claypits to the Jurassic, the Duaringa and Goodna deposits are of tertiary age, according to an account of the stratigraphical features by Mr. B. Dunstan, Chief Government Geologist, preceding Mr. Tillyard's descriptions.

The Denmark Hill beds, which have been known since 1890 to contain fossil insects, have yielded the most interesting of the specimens discussed in this memoir. They represent eight orders (Blattoidea, Protorthoptera, Coleoptera, Odonata, Mecoptera, Lepidoptera, Protohemiptera, Hemiptera), thirteen genera and twenty-two species, of which ten genera and seventeen species are new. The chief general results are thus stated by Mr. Tillyard:

"1. Certain insect types characteristic of the late Palaeozoic in the Northern Hemisphere, and not found in the Mesozoic, are now shown to have had fairly close relatives in the Trias of Australia. Such types include *Austromylacrites* [Blattoidea], *Mesorthopteron* and *Mesomantidion* [both Protorthoptera].

2. The first known appearance of a true dragon fly [*Mesophlebia*, n. gen.], with nodus and pterostigma, can now be assigned to the Trias, instead of the Lias. It was probably an Anisopterid.

3. A Panorpid (Mecoptera—[*Mesochorista* n. gen.]) scarcely differing from a form [*Taeniochorista*] still alive in Southern Queensland, existed in the Australian Trias. This group has already been recorded from the Lias in the Northern Hemisphere.

4. A Lepidopterous insect, a fairly large moth [*Dunstania* n. gen.] is present in the Australian Trias. As the Lepidoptera have not until now been traced back beyond the upper Jurassic, this discovery is of great importance. Also, as this insect existed in a period long before that generally agreed upon when flowering plants first appeared (Lower Cretaceous), it is an interesting question as to what it fed upon and what its mouth parts were like. [A list of the fossil flora associated with the remains of the insects at Denmark Hill is given by Mr. Dunstan, p. 6, and consists of 13 species of ferns, 2 of cycads, 1 of Equisetales and 5 of conifers.]

5. A true Hemipterid (allied to the recent Jassidae) existed side by side with a large insect probably related to *Eugereon*, and hence referable to the Protohemiptera. Jassidae are known from the Lias of

the Northern Hemisphere, but the Protohemiptera did not survive beyond the Permian.

6. The large gap in the Insect Record (Trias) is at last in process of being satisfactorily bridged over."

The dragonfly, *Mesophlebia antinodalis* n. sp., is represented by a fragment, 21.5 mm. long, 11 mm. in greatest breadth, "of the greater portion of the distal half of the wing from a point on the radius about six cells proximad from the nodus, to a point just short of the wing-tip." Two of its most striking peculiarities are the "very great breadth of the wing in proportion to its length, and the close approximation [12 mm.] of the nodus to the pterostigma."

The moth, *Dunstania pulchra* n. sp., is described from an "almost perfect specimen of a left hind wing," 20 mm. long, with a greatest breadth of 11.5 mm. A footnote informs us of the subsequent discovery "of the narrower and more elongated forewing of this same species." The formation of the cells of the hind wing "appears to differ in very important points from anything known in the Lepidoptera today."

"The most striking point about the collection from St. Peter's is the occurrence of the gigantic *Mesotitan* [Protorthoptera, n. gen.], a form which certainly links up the insect fauna of this locality with that of Commentry. Although the Giant Age of Insects ceased in the Permian as far as the Northern Hemisphere was concerned, yet at St. Peter's we have direct evidence that some at least of these forms lingered on far into the Mesozoic in Australia, existing side by side with far more highly specialized Coleoptera, and closely allied to present-day forms. The cockroach, *Notoblattites*, may also be classed as a representative of a very archaic group of Blattoidea, which attained their maximum development in the Northern Hemisphere, near the end of the Palaeozoic Age."

Of *Mesotitan giganteus*, "the preserved portion of the insect measures 125 mm. long by 146 mm. wide, and appears to represent only a small basal portion of the wings. The forewing when completed was probably at least eight or nine inches long and three wide at its broadest part. If this estimate is correct, this huge insect must have had an expanse of about twenty inches." The description and the figure are disappointing on account of the fragmentary character of the remains and we would prefer to reserve our opinion as to the size and character of this fossil until more complete specimens are at hand.

Collecting Insects by the aid of Molasses Traps (Col.).

My attention was first called to this manner of collecting some four years ago, by overhearing some one remark that certain parties had collected a large number of beetles of the genus *Cychrus* in the mountains of North Carolina by using molasses traps. I made my first attempt with fly-traps, in which I placed a small tray of molasses; later on, I tried half-pint milk bottles, but had little success with either.

This year I used jelly glasses, and my efforts were crowned with success. The glasses were sunk in the earth with the tops level with the ground. About two inches above the glass a flat stone or piece of board was placed to keep out the rain. In each glass I placed about an inch of molasses. The dark New Orleans molasses seems to be the best to bait the traps with. In removing the insects from the traps I used a rather stiff, flat brush about a half-inch in width, with which I transferred the insects to a wide mouth bottle of alcohol. In the thirty-eight years that I have been collecting, I have turned over thousands of stones and logs, and raked over a few hay-wagon loads of dead leaves, and have only found eight specimens of *Carabus serratus*, while my four traps in four weeks caught forty-six specimens. This is not an exceptional case, as in the same time I removed as many specimens of *Cyprus stenostomus* and *Dicaelus dilatatus* from the traps as I have found in twenty years. The *Cyprus* and *Carabus* have no membranous wings, so, not being able to fly, we seldom find them around the electric lights; but they manage to walk, crawl or stumble into the molasses traps.

Carabidae are the principal beetles attracted, but quite a number of beetles belonging to other families will be found in the traps, as well as many insects belonging to orders other than Coleoptera. In all the articles published on "Directions for Collecting and Preserving Insects" that I have consulted, little or nothing is mentioned about this way of collecting.—PHILIP LAURENT, Philadelphia, Pa.

Some Synonymy in the Hesperiidae (Lep.).

Nearly twenty-four years ago I described a *Pamphila* in the Strecker collection and called it *streckeri* in honor of the owner of the specimen. I was told it was taken in Florida and had no reason at that time for doubting the correctness of the statement. As the species has not been found in Florida since, there is good reason for doubting the locality given for the type of *streckeri*, although it is not impossible that it may be found in that State. In the winter of 1914 I paid a visit to my friend Mr. Charles T. Ramsden, who lived on the San Carlos plantation near Guantanamo, Oriente, Cuba. While collecting a few miles from San Carlos I took two specimens of a *Pamphila* which reminded me of *streckeri* although I had not seen the latter for so many years. The two specimens were taken February 11th. I sent a specimen of the Cuban species to Mr. W. J. Gerhard at the Field Museum, Chicago, to be compared with the type of *streckeri*, and he reported them to be the same. Also the description of *streckeri* agrees perfectly with the Cuban specimens.

The species was originally described under the name *radians* in 1857 and the synonymy is as follows—

1857. *Hesperia radians* Luc., Sagra, Hist. Cuba, p. 650.
1881. *Pamphila radians* Gundl., Cont. Entom. Cubana, p. 151.
1893. *Pamphila streckeri* Skinner, Ent. News, p. 211.

We will know some day whether *radians* is found in Florida or confined to the West Indies.

HENRY SKINNER.

The Rate of Locomotion of *Vanessa antiopa* (Lep.) in different luminous intensities and its bearing on the "continuous action theory" of orientation.

If orientation in light is dependent upon the stimulation of both retinas by equal amounts of light energy, as is held by Loeb and his "continuous action theory," butterflies should move more rapidly in bright light than in weak. To test this the rate of movement of ten specimens of *Vanessa antiopa* in each of two lights, one about 2000 times stronger than the other, was ascertained. They did not move faster in the bright light than in the weak, but, on the contrary, 70 per cent. of the insects actually moved more rapidly in the weak light than they did in the strong. These results support those presented previously, which indicated that the orientation of *Vanessa* in light cannot be accounted for on the basis of Loeb's theory. Moreover, some positive evidence has been obtained in favor of the theory that orientation is dependent upon the time rate of the change of intensity, since the results of some experiments seem to indicate that *Vanessa* moves faster in intermittent than in continuous light.—W. L. DOLLEY, JR., Randolph-Macon College (in Abstracts of Proceedings, Amer. Soc. Zool., Dec. 27-29, 1916).

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded.

The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new species are all grouped at the end of each Order of which they treat. Unless mentioned in the title, the number of the new species occurring north of Mexico are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

- 4—The Canadian Entomologist. 11—Annals and Magazine of Natural History, London. 50—Proceedings, U. S. National Museum. 51—Novitates Zoologicae, Tring, England. 68—Science, New York. 87—Bulletin, Societe Entomologique de France, Paris. 92—Zeitschrift fur wissenschaftliche Insektenbiologie. 153—Bulletin, American Museum of Natural History, New York. 179—Journal of Economic Entomology. 189—Journal of Entomology and

Zoology, Claremont, Calif. 194—Genera Insectorum. Diriges par P. Wytsman, Bruxelles. 322—Journal of Morphology, Philadelphia. 369—Entomologische Mitteilungen, Berlin-Dahlem. 373—Contributions to the Natural History of the Lepidoptera of North America, by Wm. Barnes & J. H. McDunnough, Decatur, Ill. 402—University of California Publications in Zoology, Berkeley, Cal. 411—Bulletin, The Brooklyn Entomological Society. 520—Proceedings, British Columbia Entomological Society, Victoria. 541—Archives Neerlandaises des Sciences exactes et Naturelles, La Haye. 542—Proceedings, New England Zoological Club, Cambridge, Mass.

GENERAL SUBJECT. Cook, A. S.—Obituary note by D. L. Crawford, 189, viii, 169-70. Hamilton, J. A.—Entomology in the public school, 520, No. 9, 60-2. Holloway, T. E.—Moving lights versus stationary lights in phototropism experiments, 179, ix, 570-1. Melander, A. L.—The pronunciation of insect names, 411, xi, 93-101. Petrunkevitch, A.—Morphology of invertebrate types, 263 pp., ill. (New York, The Macmillan Co., 1916).

PHYSIOLOGY AND EMBRYOLOGY. Baumberger & Glaser—The rearing of *Drosophila ampelophila* in solid media, 68, xlvi, 21-22. Payne, F.—A study of the germ cells of *Gryllotalpa borealis* and *G. vulgaris*, 322, xxviii, 287-327. Reeves, E. M.—The inheritance of extra bristles in *Drosophila melanogaster*, 402, xiii, 495-515. Williams, F. X.—Photogenic organs and embryology of lampyrids, 322, xxviii, 145-208.

ARACHNIDA, ETC. Cockle, J. W.—Notes on the wood-tick (*Dermacentor venustus*), 520, No. 9, 53-7. Moles, M. L.—The growth and color patterns in spiders, 189, viii, 129-57.

NEUROPTERA, ETC. Walker, E. M.—The nymphs of the N. Am. species of *Leucorrhinia*, 4, 1916, 414-22.

ORTHOPTERA. Caudell, A. N.—Locustidae, subf. *Saginae*; subf. *Hetrodinae*; subf. *Mecopodinae*, 194, Fasc. 167, 10 pp.; Fasc. 168, 13 pp.; Fasc. 171, 31 pp. Bolivar, I.—*Acrididae, Pamphaginae*, 194, Fasc. 170, 40 pp.

HEMIPTERA. Swellengrebel, N. H.—Quelques remarques sur la facon de combattre le pou des vetements, 541, iii, 1-31.

Hollinger, A. H.—The shell-bark hickory mealy-bug (*Pseudococcus jessica* [1 n. sp.]), 4, 1916, 411-13.

LEPIDOPTERA. Barnes & McDunnough—Notes on Walker's types of Geometridae in the D'Urban collection; Synonymic notes on No. Am. Heterocera, 373, iii, 35-48; 157-200. Clark, B. P.—New American Sphingidae, 542, vi, 39-50. Jordan & Eltringham—

Rhopalocera, Fam. Nymphalidae, Subf. Acraeinae, 194, Fasc. 169, 81 pp. Mabille & Bouillet—Descriptions d'Hesperides nouveaux, 87, 1916, 243-7. Meyrick, E.—Heterocera. Fam. Glyphipterygidae; Fam. Heliodinidae, 194, Fasc. 164, 39 pp.; Fasc. 165, 29 pp. Rothschild, L.—Notes on Amathusiidae, Brassolidae, Morphidae, etc., with descriptions of n. sps., 51, xxiii, 299-318. Stichel, H.—Beitrag zur kenntnis der Riodiniden fauna Sudamerikas, 1, 92, xii, 238-44. Watson, J. R.—Life history of Anticarsia gemmatalis, 179, ix, 521-28.

Barnes & McDunnough—New species of N. American L. [1 n. gen., many n. sps.]; Notes on No. Am. diurnal L. [1 n. sp.], 373, iii, 1-34; 53-152. Grossbeck, J. A.—Insects of Florida. IV, Lepidoptera [many new], 153, xxxvii, 1-147.

DIPTERA. Dove, W. E.—Some notes concerning overwintering of Musca domestica at Dallas, Texas, 179, ix, 528-38. Hendel, F.—Beitrag zur systematik der Acalyptraten Musciden, 369, v, 294-99.

Malloch, J. R.—A key to the males of the anthomyiid genus Hydrotaea recorded from N. Am. [1 n. sp.], 411, xi, 108-10.

COLEOPTERA. Benick, L.—Beitrag zur kenntnis der Megalopiniden und Steninen, 369, v, 238-52. Borchmann, F.—Die gattung Colparthrum, 369, v, 228-37. Lameere, A.—Trois Prioninae nouveaux, 87, 1916, 233-5. Marshall, G. A. K.—On new neotropical Curculionidae, 11, xviii, 449-69. d'Orchymont, A.—De la place que doivent occuper dans la classification les sous-familles des Sphaeridiinae et des Hydrophilinae, 87, 1916, 235-40. Verhoeff, K. W.—Studien ueber die organisation der Staphylinoidea, 92, xii, 245-9 (cont.).

Pierce, W. D.—Studies of weevils (Rhynchophora) with descriptions of n. gen. & n. sps. [1 n. gen.; 1 n. sp.], 50, li, 461-473. Shaef-fer, C.—Two n. sps. of Cebrio, 411, xi, 107-8.

HYMENOPTERA. Bequaert, J.—On the occurrence of Vespa austriaca in the northeastern U. S., 411, xi, 101-7. Nininger, H. H.—Studies in the life histories of two carpenter bees of California, with notes on certain parasites, 189, viii, 158-68. Smith, H. S.—The habits of leaf-oviposition among the parasitic H., 68, xliv, 925-6. Wheeler, W. M.—An Indian ant introduced into the U. S. (Triglyporthrix striatidens), 179, ix, 566-9. Wolff, M.—Ueber die chalcidiergattung Chrysocharis, 369, v, 258-82.

Girault, A. A.—The N. A. sps. of Dibrachys with a note on Uriella; The occurrence of Neoderostenus in N. Am. [1 n. sp.]; A n. gen. of omphaline Eulaphid chalcis-flies from Maryland [1 n. g., 1 n. sp.], 4, 1916, 408-9; 409; 410. New sps. of parasitic H. [6 new], 411, xi, 111-3.

OPENING UP A NEW FIELD.

The Thomas Say Foundation of the Entomological Society of America has certainly introduced a worthy and valuable addition to entomological literature, namely, a revision entitled *SARCOPHAGA AND ALLIES IN NORTH AMERICA*, by J. M. ALDRICH. This work, appearing in octavo size, containing 302 pages and 16 plates, treats especially of the North American and also of some South American species of the Muscoid family Sarcophagidae *sens. strict.*, containing the large genus *Sarcophaga*. The American species of this dipterous family have been a taboo to all students, mainly on account of the numerous unrecognizable de-color and characters of its species.

scriptions, of the scattered location of types, and of the similarity of

The present paper is a preliminary revision of the North American species. The family as limited here may be characterized as follows: Eyes bare; proboscis stout, short; palpi distinct; parafacials with orbital setulae; arista plumose both sides on at least basal half. Scutellum with at most one pair of discal macrochaetae. Abdomen generally gray or silvery and tessellated; the segments without discal macrochaetae. Fourth vein of wing subangularly bent and ending in the costa distinctly before apex.

This throws out some species that may very properly be placed in other allied families, or may have to be included when the limits of the family are more thoroughly understood. The author has been very consistent in the recognition of genera. Those not distinguishable in both sexes are not recognized as valid but are suggested as possible subgenera, although not treated as such in the present work. As the author says in his introduction: "A survey of the present status of the Muscoid Diptera indicates unmistakably that our present great need is not more genera, but a more complete knowledge of species. . . . One of the main objects of the present work is to make the identification of species as simple and certain as possible. . . . This object would inevitably be defeated by the erection of a considerable number of indistinctly separated genera." Let us hope that this family will not be invaded by the mathematical taxonomist with his generic formulae.

Of the sixteen genera included and treated, eight are new. Among these 145 species and varieties are distributed, of which 125 are placed in the genus *Sarcophaga*, and 101 of these are described as new. A few European species are recognized and the status of some previously described American species have been established. A case of the latter, *Sarcophaga sarraceniae* Riley, illustrates the value of establishing a single type for a species. The species are based primarily on the male sex, which offers very definite characters in the genitalia, but in most cases, however, the other sex is recognized where possible in the descriptions, and possesses many of the characters of the male which can be used as guides to the determination. It is unfortunate that the females are not so readily determined, but after the species have been

definitely determined by the males, the other sex can be more intelligently studied and that will no doubt result in the discovery of some satisfactory characters of differentiation. The species of *Sarcophaga* are for convenience divided into eight groups which are fairly well defined. A table of species is given which is very practical, simple and explicit. Considering the obscurity in which the species of this family have been existing, the ease with which the species can be run out, even within at least two or three without considering the genitalia, seems almost incredible.

Another commendable feature is the consecutive numbering of all the species treated and giving the same number to all figures relating to each respective species. Although this adds some confusion to the sequence of the numbers appearing on the plates in the cases of the species not figured, this disadvantage is trivial in comparison to the convenience it gives in working with the paper.

As to adverse criticism, I do not care to enter this phase of the subject at this time. The excellency of the work in its usefulness will far outweigh its defects. I must say, however, that I do not approve of the typography of the paper. There is too much monotony in the style of composition as one turns over page after page. With a few exceptions there are no catchy divisions between the description, notes and habitat data. The method of citing habitat data might certainly be improved. The use of the parentheses is not consistent. Sometimes they may include the name of the collector or, again, may include the name of the town of a State. In working over the tables I noticed what is evidently a slip of the pen, on page 67. Table of species of Group A, 1, should read: Middle femur with . . . (not Middle tibia with . . .). The use of the term bristle is sometimes misleading. On the face the hairs may be described as bristles while in another species those of the same size and stoutness may be described as hairs. The same will apply in some cases to the hypopygium.

In conclusion I wish to express my appreciation of the work as a whole, and I trust the author will continue to give us this kind of work, which is certainly needed in other groups of the Diptera.—E. T. C., JR.

[The above mentioned publication may be secured by addressing Dr. E. D. Ball, Capitol Bldg., Madison, Wisconsin. Price, \$3.00].

Doings of Societies.

Entomology at the Convocation Week Meetings.

Following our custom for the preceding three years, we present below a list of the papers having any bearing on entomology entered on the programs of the American Association for the Advancement of Science and of the affiliated societies which met in New York City, December 26 to 30, 1916. Our reason for quoting these titles is to make

known those entomological subjects on which students throughout the country are engaged. We have therefore classified them under one or more headings, the cross-references enabling the interested reader to learn of work done either from the taxonomic or the biological side. Most of these papers will, doubtless, be published and, when they appear, will be registered in our monthly summary of Entomological Literature. As publication of many of them will probably not occur for some months, the present list is justifiable as giving advance information to those who have not access to the programs on which it is based.

In this connection, however, we would call attention to the printed abstracts of the papers presented to the American Society of Zoolologists (97 pages), and the American Association of Anatomists (147 pages), published by the Wistar Institute of Anatomy and Biology, Philadelphia, and sent before the meeting to the members of these societies, and also the abstracts contained in the program of the Ecological Society of America, also mailed before the meetings began. These three give often fairly full summaries of the contents of papers, although they include a relatively small proportion of the entomological papers of the week.

In the following list unmarked papers are from the program of the American Association of Economic Entomologists, those starred (*) from that of the Entomological Society of America; others are designated by the names, or abbreviations of the names, of the respective societies to which they were offered. The total number here listed is 139, of which 70 are from the program of the Economic Entomologists (including 6 from the section of Horticultural Inspectors and 6 from that of Apiary Inspection), 26 from the Entomological Society, 17 from the Zoologists, 14 from the Ecological Society, 5 from Section F (Zoology), A. A. A. S., 3 from the American Society of Naturalists, 2 from other sections A. A. A. S., 1 from the Anatomists, and 1 from the Physiological Society. The total is far in excess of any previous one, the figures as reported in the News for February and March, 1916, pages 91, 143, being 85 (Cleveland, 1912), 74 (Atlanta, 1913), 96 (Philadelphia, 1914), and 93 (Columbus, 1915).

GENERAL SUBJECTS.—ERNEST WILLIAM BROWN, The Relations of Mathematics to the Natural Sciences. (Sect. A. A. A. S.)—H. F. OSBORN, Application of the Laws of Action, Reaction and Interaction in Life Evolution. (Naturalists.)—T. D. A. COCKERELL, Fossil Insects* (Annual address of the Ent. Soc. Amer.); Entomology in the National Museum*.—STEPHEN A. FORBES, University of Illinois, The Relations of Ecology and Economic Entomology. (Ecol. Soc. Amer.)—C. GORDON HEWITT, Ottawa, Canada. Annual address: Insect Behavior as a Factor in Applied Entomology.—E. H. SELLARDS ET AL., Physical History of following States (Fla., Ga., Ill., Ia., Md., N. J., N.

C., N. Da., O., Okl., S. Da., Tenn., Tex., Ver., Va., Wis.) (Sect. E, A. A. A. S.)

METHODS.—C. W. COLLINS, Melrose Highlands, Mass., Methods Used in Determining Wind Dispersion of the Gypsy Moth and Some Other Insects.—S. S. CROSSMAN, Melrose Highlands, Mass., Some Methods of Colonizing Imported Parasites and Determining Their Increase and Spread.—W. H. GOODWIN, An Improved Pin Tray.*—J. W. MCCOLLOCH, Manhattan, Kansas, A Method for the Study of the Life-histories of Underground Insects.—Z. P. METCALF, Entomological Charts.*—B. H. WALDEN, New Haven, Conn., Simple Apparatus for Insect Photography.

MORPHOLOGY.—ADELBERT L. LEATHERS (Olivet College), Section F—Some Homologies in the Epipharynx and Hypopharynx of the Nematocerous Diptera.—A. PETERSON and A. D. MACGILLIVRAY, Some Modifications in the Legs of Insects.*—WILLIAM COLCORD WOODS, The Malpighian Vessels of the Alder Flea-beetle.*

EMBRYOLOGY, ETC.—J. R. DE LA TORRE BUENO, Life Histories and Habits of Gerridae.*—ULRICH DAHLGREN (Princeton University), Investigations of the Light Organs of Arthropods. (Zoologists.)—B. H. GRAVE (Knox College), Life History of *Zeugophora scutellaris*. (Zoologists.)—J. A. HYSLOP, The Phyletic Value of Ontogenetic Characters in the Elateridae.*—WILLIAM PATTEN, Dartmouth College, The Notochord of an East Indian Scorpion. (Anatomists.)—MAX P. ZAPPE, New Haven, Conn., Egg-Laying Habits of *Diprion simile* Hartig.

CYTOTOLOGY.—W. L. BAUMGARTNER (University of Kansas), The Chromosome Complex in *Apithes agitator*.* (Zoologists.)—C. B. BRIDGES, Deficiencies in the Genetic Materials of the Chromosomes of *Drosophila*. (Naturalists.)—E. ELEANOR CAROTHERS (University of Pennsylvania), The Segregation and Recombination of Homologous Chromosomes in Two Genera of Acrididae (Orthoptera). (Section F.)—CAROLINE M. HOLT (University of Pennsylvania), Multiple Complexes in the Alimentary Canal of *Culex pipiens*. (Section F.)—C. E. McCCLUNG (University of Pennsylvania), Multiple Chromosomes of *Hesperotettix* and *Mermiria*. (Zoologists.)—D. H. WENRICH (University of Pennsylvania), Synapsis and Chromosome Organization in the Male Germ Cells of *Chorthippus* and *Trimerotropis*. (Section F.)—P. W. WHITING (University of Pennsylvania), The Spermatogenesis of *Culex pipiens*, L. (Section F.)

GENETICS (all at the Zoologists.)—CALVIN W. BRIDGES (Columbia University), The Elimination of Males in Alternate Generations of Sex-Controlled Lines.—ROScoe R. HYDE (Indiana State Normal School), Effect on Fertility of Crossing Closely and Distantly Related Stocks of *Drosophila ampelophila*.—CHAS. W. METZ (Carnegie Institution of Washington), Linkage in the Sex-Chromosome of a New

Species of *Drosophila*.—THOMAS HUNT MORGAN (Columbia University), An Examination of the So-Called Process of Contamination of Genes.—ROBERT K. NABOURS (Kansas State Agricultural College), Two Classes of Factors for Color Patterns in *Paratettix*.—ALFRED H. STURTEVANT (Columbia University), An Analysis of the Effect of Selection on Bristle Number in a Mutant Race of *Drosophila*.—ALEXANDER WEINSTEIN (Columbia University), Coincidence of Crossing Over and the Chromosome Theory of Linkage.

PHYSIOLOGY.—J. P. BAUMBERGER, The Food of *Drosophila**.—WM. L. DOLLEY, JR. (Randolph-Macon College), The Rate of Locomotion of *Vanessa antiopa* in Different Luminous Intensities and Its Bearing on the Continuous Action Theory of Orientation (Zoologists).—S. I. KORNHAUSER (Northwestern University), Further Studies on Changes in *Thelia bimaculata* Brought about by Insect Parasites (Zoologists).—N. E. MCINDOO (Bureau of Entomology), Recognition Among Insects (Zoologists).—S. MERCULIS, The Hydrolytic Products of Chitin (Physiological Society).—BRADLEY M. PATTEN, Western Reserve University, Reaction of the Whip-Tail Scorpion to Light (Zoologists).—C. H. RICHARDSON, New York City, The Response of the House-fly to Certain Foods and their Fermentation Products.—V. E. SHELFORD, University of Illinois, Physiological Problems in the Life-histories of Animals with particular reference to Seasonal Appearance; illustrated by Seasonal Succession of Spiders on a small plot (Ecol. Soc.).—A. FRANKLIN SHULL, Parthenogenesis and Sex in *Anthothrips* (Naturalists).—See also under General Subjects: Hewitt.

ECOLOGY.—CHARLES C. ADAMS, Syracuse University, An Ecological Survey of Oneida Lake, New York (Ecol. Soc.).—DR. J. BECKQUAERT, Recent Observations and Theories concerning the Origin of Social Habits among Vespidae.*—M. W. BLACKMAN and H. H. STAGE, Ithaca, N. Y., On the Succession of Insects in Dying, Dead and Decaying Hickory.—FREDERIC E. CLEMENTS, University of Minnesota, The Development and Structure of Biotic Communities (Ecol. Soc.).—ALFRED E. CAMERON, Dominion Entomological Service, Relation of Soil Insects to Climatic Conditions (Ecol. Soc.).—E. P. FELT, Distribution of Gall Midges.*—HENRY FOX, Bureau of Entomology, Distribution of Grasshoppers in relation to the Plant Formations of Tidal Marshes (Ecol. Soc.).—A. I. GOOD, Insect Collecting in Cameroon, West Africa.*—H. A. GOSSARD, Distribution of the Ohio Brood of Periodical Cicada with Reference to Soil.*—ROBERT F. GRIGGS, Ohio State University, Notes on the Return of Animal Life to the Katmai District, Alaska (Ecol. Soc.).—CLYDE C. HAMILTON, Cornell University, The Importance of Soil Temperatures to Insects, as indicated by their behavior (Ecol. Soc.).—THOMAS J. HEADLEE, New Brunswick, N. J., Some Facts Relative to the Influence of Atmospheric Humidity on Insect Metabolism.—A. D. HOPKINS, Latitude, Longitude and

Altitude as Factors Affecting Insect Life (Ecol. Soc.).—MINNA E. JEWELL, University of Illinois, The Survival of Certain Aquatic Animals in the Absence of Oxygen under different conditions of Acidity and Alkalinity (Ecol. Soc.).—W. H. LONGLEY (Goucher College), A Revised Working Hypothesis of Mimicry (Zoologists).—J. W. McCULLOCH, Manhattan, Kansas, Wind as a Factor in the Dispersion of the Hessian Fly.—HERBERT OSBORN, Ohio State University, Association and Succession in the Meadow Complex with special reference to Insects (Ecol. Soc.); Biological Notes on *Miris dolabrata*.*—W. D. PIERCE, Climate as Related to the Growth of Insects (Ecol. Soc.).—V. E. SHELFORD, Evaporation as a Climatic Factor affecting Animals (Ecol. Soc.).—GEORGE N. WOLCOTT, University of Illinois, The Influence of Rainfall and some other factors on the Abundance of the Sugar Cane Moth Stalk Borer (*Diatraea saccharalis*) (Ecol. Soc.).—See also under General Subjects: Forbes; under Methods: Collins.

INSECTS INJURIOUS TO PLANTS.—GEORGE G. AINSLIE, Knoxville, Tenn., Crambid Moths and Light.—E. D. BALL, Madison, Wis., Economy and Efficiency in Grasshopper Destruction.—GEO. C. BECKER, Fayetteville, Ark., Notes on the Peach-Tree Borer, *S. exitiosa*; On the Control of *Saperda candida*.—M. W. BLACKMAN, Syracuse, N. Y., Notes on Insects Bred from Dying and Dead Larch.—A. F. BURGESS, Melrose Highlands, Mass., and C. C. McDONNELL, Washington, D. C., A New Tree-Banding Material for the Control of the Gipsy Moth.—A. C. BURRILL, Insects of the Year in Idaho.—R. A. COOLEY, Bozeman, Mont., The Sugar Beet Silphid (*Silpha bituberosa* Lec.).—C. R. CROSBY and MORTIMER D. LEONARD, Ithaca, N. Y., The Farm Bureau as an Agency for Demonstrating the Control of Injurious Insects.—IRVING W. DAVIS, New Haven, Conn., Present Status of the Gipsy and Browntail Moths in Connecticut.—JOHN J. DAVIS, West Lafayette, Ind., A Chemical Feeding Analysis of White Grubs and May-beetles and its Economic Application.—GEO. A. DEAN, Manhattan, Kansas, Results of Ten Years of Experimental Wheat Sowing to Escape the Hessian Fly.—E. P. FELT, Albany, N. Y., Side Injury and Codling Moth Control.—W. F. FISKE, South Hanson, Mass., Insects Injurious to Vegetation; Some Factors in the Natural Control of Insects.—HENRY FOX, Clarksville, Tenn., Summary of Investigation of *Ligyrus rugiceps* in Virginia.—P. A. GLENN, Urbana, Ill., Ash Seed Weevils; A New Oyster Shell Scale. (An oyster shell scale very destructive to certain ornamental shrubs and shade trees, heretofore classified as *Lepidosaphes ulmi*, is a distinct species.)—HUGH GLASGOW, Geneva, N. Y., The Sinuate Pear-Borer in New York.—L. HASEMAN, Columbia, Missouri, Hessian Fly Investigations.—WM. P. HAYES, Manhattan, Kansas, Studies on the Life-history of *Ligyrus gibbosus* DeG.—T. J. HEADLEE, New Brunswick, N. J., A Further Test of the Efficiency of Sulphur-arsenical Dust in the Control of the Strawberry

Weevil.—L. O. HOWARD, Washington, D. C., An Appreciation of T. W. Harris.—E. O. G. KELLY, Wellington, Kansas, The Toxoptera Outbreak in 1916.—QUINCY S. LOWRY, New Haven, Conn., An Outbreak of the Eight-Spotted Forester, *Alypia octomaculata* Fab., in New Haven, Conn.—SIMON MARCOVITCH, St. Paul, Minn., The Strawberry Weevil in Minnesota.—JOSEPH H. MERRILL, Manhattan, Kansas, Further Data on the Relation between Aphids and Fire Blight, *Bacillus amylovorus* (Bur.) Trev.—Z. P. METCALF, West Raleigh, N. C., Lime as an Insecticide.—WALTER C. O'KANE, Durham, N. H., Some Facts about Carbon Disulphide.—HERBERT OSBORN, Columbus, Ohio, The Economic Importance and Control of *Miris dolabrata*.—T. H. PARKS, Manhattan, Kansas, A Country-wide Survey to Determine the Effect of Time of Seeding and Presence of Volunteer Wheat upon the Extent of Damage by the Hessian Fly.—PERCIVAL J. PARROTT, Geneva, N. Y., The Radish Maggot and Screening.—W. J. PHILLIPS, Charlottesville, Va., Report on *Isosoma* Investigations.—GEORGE I. REEVES, Salt Lake City, Utah, The Alfalfa Weevil.—V. I. SAFRO, Louisville, Ky., Miscellaneous Notes on Nicotine Insecticides.—E. R. SASSER, Washington, D. C., Recent Vacuum Fumigation Results; Important Foreign Insect Pests Collected on Imported Nursery Stock in 1916 (Hortic. Insp. Sect. Econ. Ent.).—W. J. SCHHOENE, Blacksburg, Va., The Weakness of our Present System of Inspection of Foreign Shipments (Hortic. Insp. Sect. Econ. Ent.).—HARRY B. SHAW, in charge of New York Port Inspection, Activities of the Federal Horticultural Board at the Port of New York (Hortic. Insp. Sect. Econ. Ent.).—HARRY S. SMITH, Sacramento, Cal., On the Life-history and Successful Introduction into the United States of the Sicilian Mealybug Parasite.—THOMAS J. TALBERT, Columbia, Missouri, The 1916 Hessian Fly Campaign in Missouri.—F. L. WASHBURN, Minneapolis, Minn., The State Entomologist's Work with Pine Blister Canker in Minnesota; Potato Inspection in Minnesota (Hortic. Insp. Sect. Econ. Ent.).—DISCUSSION, How Are We Aiding Nurserymen by Enforcing Sanitation of Adjacent Premises? Reports of Methods Employed in Various States (Hortic. Insp. Sect. Econ. Ent.).—See also under Methods: Collins; under Ecology: Blackman & Stage.

INSECTS INJURIOUS TO MAN AND TO DOMESTIC ANIMALS.—F. C. BISHOPP, Dallas, Texas, Some Problems in Insect Control about Abattoirs and Packing Houses.—W. E. BRITTON, New Haven, Conn., Recent Anti-Mosquito Work in Connecticut.—C. T. BRUES, Forest Hills, Mass., New Evidence Concerning Insects as Possible Carriers of Infantile Paralysis.—ERNEST N. CORY, College Park, Md., The Protection of Dairy Cattle from Flies.—L. HASEMAN, *Sarcophaga haemorrhoidalis* Larvae as Parasites of the Human Intestine.*—THOS. J. HEADLEE, Some Recent Advances in Mosquito Work in New Jersey.*—C. W. HOWARD, St. Paul, Minn., Insect Transmission

of Infectious Anemia of Horses.—TRUMAN L. KELLY, University of Texas, The Effect of Hookworms and Malaria upon the Mental Capacity of School Children (Sect. L., A. A. A. S.).—GEORGE H. LAMSON, JR., Storrs, Conn., Mercurial Ointment, an Effective Control for Hen Lice.—U. C. LOFTIN and E. W. BERGER, Mosquito Traps and Catches.*—JOHN W. SCOTT (University of Wyoming), Some Experiments on the Transmission of Swamp Fever by Insects (Zoologists).

APICULTURE.—E. G. CARR, Some New and Practical Methods for the Control of European Foulbrood.—BURTON N. GATES, The Principles of a Course in Beekeeping.—FRANK C. PELLETT, Problems of Bee Inspection.—MORLEY PETTIT, The Way I Would Like to Carry on Bee Disease Control.—E. F. PHILLIPS, The Results of Apiary Inspection.—E. R. ROOT, The Opportunity and Rewards in American Bee-keeping.

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ARACHNIDA.—See under Embryology: Patten; under Physiology: Patten, Shelford.

ORTHOPTERA.—C. GORDON HEWITT, Observations on *Grylloblatta campodeiformis* Walker.*—See also under Cytology: Baumgartner, Carothers, McClung, Wenrich; under Genetics: Nabours; under Ecology: Fox; under Parasites of Insects: Glaser, du Porte and Vanderleck.

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COLEOPTERA.—J. A. HYSLOP, Hagerstown, Md., Notes on Introduced Weevil (*Ceutorhynchus marginatus* Payk.).—J. A. MANTER, Storrs, Conn., Notes on the Bean Weevil (*Bruchus obtectus* Say).—See also under Morphology: Woods; under Embryology: Dahlgren, Grave, Hyslop; under Insects Injurious to Plants: Becker, Cooley, J. J. Davis, Fox, Glenn, Glasgow, Hayes, Marcovitch, Reeves.

LEPIDOPTERA.—EDNA MOSHER, The Morphology of a Lepidopterous Head.*—See also under Methods: Collins; under Physiology: Dolley; under Ecology: Wolcott; under Insects Injurious to Plants: Ainslee, Becker, I. W. Davis, Lowry.

DIPTERA.—JAS. S. HINE, The Genus *Erae* in North America.*—J. L. KING, Notes on the Habits and Immature Stages of Cyrtidae.*—See also under Morphology: Leathers; under Cytology: Bridges, Holt, Whiting; under Genetics: Bridges, Hyde, Metz, Morgan, Sturtevant, Weinstein; under Physiology: Baumberger, Richardson; under Ecology: Felt, Jewell, McCulloch; under Insects Injurious to Man, etc.: 10 papers.

HEMIPTERA.—R. A. COOLEY, A Guide to a Laboratory Study of

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THYSANOPTERA.—See under Physiology: Shull.

HYMENOPTERA.—See under Embryology: Zappe; under Physiology: Kornhauser, McIndoo; under Ecology: Becquaert; under Insects Injurious to Plants: Phillips.

Feldman Collecting Social.

Meeting of September 20th, 1916, at the home of H. W. Wenzel, 5614 Stewart Street, Philadelphia, Pa.; fourteen members and one visitor present. President H. A. Wenzel in the chair.

Coleoptera. Mr. Laurent exhibited two ♀ *Scaphinotus viduus* Dej., which he collected at Chestnut Hill, Pennsylvania, July 29, 1916. Mr. Kaeber said he had always heard it reported that the females of the *Cyclocephalac* were rare and had found it so himself, only having obtained one female in several seasons' collecting until this year in Philadelphia Neck. He collected also many *Ochrosidea villosa* Burm. at light, July 11 to July 14, many in coitus, and in all fifty or sixty females. Mr. Hornig exhibited a specimen of the oriental longicorn *Melanusia chinensis* Forst., collected near Wayne Avenue, in Germantown, August 6, 1916: also two *Cicindela unipunctata* Fab. from Alloway, N. J., August 6, 1916. Mr. Hoyer showed pieces of cedar wood which have been in a cellar in Oak Lane all summer and are completely riddled with some Coleopterous larvae. Mr. H. W. Wenzel exhibited six specimens of a *Helops*, which H. A. Wenzel and he had collected on leaves of oak at Millville, New Jersey, July 15, 1916; this approaches *cisteloides* Germ., which he formerly had only from Missouri; also *Polyphylla variolosa* Hentz, which was exceedingly common at light at Anglesea, New Jersey, July 3, 1916, but all specimens captured were males. Mr. Geo. M. Greene exhibited three species of *Lema*, which he had collected at Plummer's Island, Maryland, August 30, 1916; *L. sexpunctata* Oliv.; *L. albini* Lac. and *L. n. sp.*

Lepidoptera. Mr. Hornig said he had found many hairy Lepidopterous larvae on fungus at Alloway, New Jersey, but all died before he had the opportunity to identify them. Mr. Daecke said he had seen a female *Papilio ajax* Linn. flying at Camp Hill, Pennsylvania, July 23, which settled on a paw-paw tree and laid eggs singly here and there; on same day he had seen larvae, large and small, so that he had seen all the stages in one day except the pupa; he said that the food plant

of *Desmia funeralis* Hbn. was commonly grape leaves, but he had reared one from "evening primrose," the common food plant for *Pantographa limata* G. and R. is oak, but he had reared one from linden; he exhibited and recorded *Pyrausta unifascialis* Pack. from Rockville, Pennsylvania, May 28, 1916.

Diptera. Mr. Hornig said he observed at his laboratory at City Hall larvae of *Psorophora ciliata* Fabr. feeding on larvae of other mosquitoes. Mr. Daecke exhibited a specimen of *Promachus rufipes* Fabr., which he collected at Ocean Gate, New Jersey, August 20, 1916; at the April meeting he recorded the first capture of this species in New Jersey.

Hymenoptera and Strepsiptera. Mr. Geo. M. Greene said the wasp exhibited at the June meeting had been identified for him while in Washington, D. C., by Mr. Rohwer as *Sphex picipennis* and later dissected by Dr. Pierce and found to contain two pupae of *Eupathocera* sp.?

Adjourned to the annex.

Meeting of October 18th, 1916, at the same place. Eleven members and one visitor were present, President H. A. Wenzel in the chair.

Coleoptera. Mr. H. W. Wenzel exhibited *Cicindela rugifrons* Dej. from Manahawkin, Bamber and Pine Beach, New Jersey; also reported *C. abdominalis* Fabr. from the latter two places in September and stated that all *Cicindelae* were common in above region this season.

Diptera. Dr. Skinner spoke of finding the larvae of a *Cuterebra* in living white rabbits on his farm near Narberth, Pennsylvania.

Orthoptera. Mr. Laurent exhibited *Gryllus domesticus* Linn. taken at Mt. Airy, Pennsylvania, September 14, 1916.

Adjourned to the annex.

Meeting of November 15th, 1916, at the same place. Eleven members were present. Prof. J. G. Sanders, State Zoologist of Pennsylvania, visitor; President H. A. Wenzel in the chair.

Prof. Sanders gave an interesting talk on the State Zoological Department, past, present and future. Dr. Skinner related his experiences with this department in the past.

Lepidoptera. Mr. Daecke stated that he had collected this summer three species of galls of the genus *Gnorimoschema* on three different species of "Golden Rod" at three different localities: Peters Mt. and Neversink Mt., Pennsylvania, and Ocean Gate, New Jersey. The plants were kept in flower pots under observation. August 18th a specimen hatched, but got away, when the remaining galls were promptly covered with veiling. On September 2nd a *Gnorimoschema* was found resting outside of a screened gall and since no other specimen

had emerged it must have been the one which escaped on August 18th. It was resting on a gall of its own species and was presumably awaiting the emergence of its mate. Discussing this matter, Mr. Wenzel doubted the intention of this insect to await the emerging of its mate. Dr. Skinner said that it is a common occurrence in Florida to see several males of *Heliconius charitonius* Linn. hanging on the pupa of a female awaiting her emergence.

Coleoptera. Mr. H. W. Wenzel exhibited *Megetra vittata* LeC. from New Mexico, twenty miles northeast of El Paso; also his rearranged boxes of Chrysomelidae.

Adjourned to the annex.—**GEORGE M. GREENE**, *Secretary*, and **FRANK HAIBACH**, *Secretary pro tem.*

Newark Entomological Society.

Meetings of December 10, 1916, and January 14, 1917, held in the Newark (New Jersey) Public Library. Pres. Buchholz in the chair; average attendance 11 members. At the December meeting, the following officers for 1917 were elected—*President*, Otto Buchholz; *Vice President*, F. Lemmer; *Secretary*, Harry B. Weiss; *Financial Secretary*, T. D. Mayfield; *Treasurer and Curator*, Chas. Rummel; *Librarian*, Herman H. Brehme; *Trustee*, J. B. Angelman.

Mr. Herman H. Brehme spoke of the method of heating the end of a pin on which was mounted a specimen, which one desired to remove without relaxing or danger of breaking and stated that the heat from an ordinary match was sufficient.

Lepidoptera. At the January meeting, Mr. Brehme showed recently described specimens of *Arsama brehmei* Br. & McD., which he had taken at Cliffwood, New Jersey, during May. Mr. Lemmer, at the December meeting, reported the capture of the following species not heretofore recorded from New Jersey: *Eutolype bombyciformis* Sm., Union Co., April; *Nannia refusata* Wlk., Hopatcong, July 20; *Alcis sulphuraria* Pack., Hopatcong, July 20 (all in New Jersey).

Hemiptera. At the December meeting, Mr. Weiss showed specimens and work of *Psyllia buxi* L., not before recorded from the United States and being found in different parts of New Jersey on boxwood. He also exhibited *Trioza alacris* Flor., the Bay Flea Louse, which he found at Rutherford, New Jersey, curling the leaves of bay trees. This species was introduced from Belgium and is recorded from the United States only in California.

Coleoptera. At the January meeting, Mr. Weiss showed two species of weevils new to New Jersey greenhouses, those being *Cholus forbesii* Pasc., and *Cholus cattleyae* Champ., both having been introduced from Tropical America in orchids.

HARRY B. WEISS, *Secretary*.



Emily L. Morton

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Emily L. Morton.

By H. H. NEWCOMB, Venice, California.

(Plate VIII.)

It was nearly twenty years ago that I first met Emily L. Morton. I had become much interested in her work of hybridizing the Saturniidae and accepted with great pleasure her invitation to New Windsor on the Hudson, to see her collection and to hear her own account of her experiments.

What a delightful visit that was, and what a wonderful collection she had. Since then we have become well acquainted and I am able to give a few of the more interesting events of her life.

Miss Morton was born at Rocklawn, New Windsor, New York, on the 3rd of April, 1841, in the old mansion which was built upon land that belonged to her mother's family for four generations. She and her sister still live there, the sole survivors of the family. Her father was Edmund Morton, her mother was Caroline M. Ellison, both of the city of New York.

As a very small child her entomological fancies asserted themselves; she would spend hours sitting by an ant-hill watching the little insects running in and out. She would chase butterflies and, much to her mother's horror, bring home caterpillars and other "bugs."

When she was thirteen years old she was presented with a copy of Kirby and Spence by her cousin, Dr. John W. Green. He was much interested in her longing to obtain some knowledge of the life-histories of insects and took this method of helping her. She pored over the work day and night, learning it almost by heart, although it was very scientific, and she did not know even the common names of most of the insects described. She has since tried to read this book and wonders how a child could ever have mastered its contents, for a drier and heavier work could hardly be found.

About the year 1860 another cousin, Robert R. Ellison, made a small collection of Lepidoptera and Coleoptera, and while helping him she started her own collection, gathering promiscuously everything in the line of insects.

With no books, except Kirby and Spence, no knowledge of names or terms, and no one to consult, it was uphill work; still she persevered until she came across an antiquated book with a few figures of insects, uncolored and poorly drawn. This, however, helped her a little until one happy day she procured a copy of Harris' *Insects Injurious to Vegetation*, and from this most valuable work she was able to name most of the insects she had collected.

Then Col. Thomas Arden, United States Army, presented her with nine volumes of the Agricultural Reports of New York. Scattered throughout these books were articles by Asa Fitch, then State Entomologist, and from these she extracted an immense amount of interesting and instructive information, which added greatly to her love for the study.

Soon after this she met Valentine W. Andrews, then agent for the *Canadian Entomologist*, who told her that at the Astor Library, in New York City, she would find that wonderful work on Lepidoptera, Smith & Abbot's *Insects of Georgia*.

Upon her next visit to that city she hastened to the library to see these treasures, and the good-natured librarian, noting her eagerness, installed her in an alcove, telling her she could study them there any time she was in town.

Through the *Canadian Entomologist* she became acquainted with W. H. Edwards, with whom she worked out the life-history of that curious little butterfly, *Feniseca tarquinius*. It was she who discovered the larval habits of this insect on one of her expeditions among the swamp-alders. She found the caterpillar living within the masses of the downy plant-lice, which swarm upon this tree.

From Miss Morton's letters, Edwards has written in the *Canadian Entomologist* a full account of the early stages of this interesting insect, the plates having been drawn by Mrs. Peart, of Philadelphia, showing the curious woolly larva and the little monkey-faced chrysalis.

In 1883 Miss Morton met Henry Edwards, who proved a very kind and interesting gentleman, and greatly assisted her with names and other facts. He was a most amusing and entertaining visitor, enthusiastic and in raptures over the many new specimens he caught while on a visit to her home. He was a noted tragedian and after his death his splendid collection of Lepidoptera was purchased by his company for the benefit of his widow and presented to the Museum of Natural History at New York City.

Among Miss Morton's friends was Prof. A. S. Packard, Jr., who was a kind and courteous correspondent. She drew and painted many larvae for his contemplated work on North American Lepidoptera and she possessed a copy of his beautiful work on the Geometridae, of which group she had a large assortment.

Another friend of hers was Samuel H. Scudder and considerable correspondence passed between them relative to his work of changing the old Linnean generic names, which she considered a grave mistake. In spite of their disagreement they remained firm friends until he passed away.

She also met Herman Strecker and colored for him many

of the plates of his famous work on the Lepidoptera. He told her that unless he succeeded in selling his magnificent collection for \$20,000 he would leave it to the British Museum. As a matter of fact it was purchased after his death by the Field Columbian Museum at Chicago.

Miss Morton considers her experiments in rearing hybrids of the Saturnidae her most interesting and important work. The first moths which she succeeded in crossing were *Samia cecropia* ♀ with the western *gloveri* ♂. These produced the most beautiful progeny of any of her trials, being larger than either of the parents, beautifully colored in crimson and gray.

Afterwards she successfully crossed *cecropia* with *ceanothi* and with *columbia*. Cocoons of the latter species were sent to her by her friend, James L. Mitchell, of Battle Creek, Michigan, which were searched for by him with infinite patience in the larch swamps of that locality.

Our *luna* paired with the Asiatic *selene* and produced splendid great moths, retaining the shape of the latter, but having the delicate color of the *luna*. In every case the progeny of these matings proved infertile.

Eight of these hybrids she sold to Baron Rothschild for \$40, and this was the only money she ever made from her life-long work on Entomology.

Among her many accomplishments was that of cabinet-maker. For her collection she made a big cabinet of sixty drawers, arranged in three tiers, doing even the glazing herself. Besides this, she made innumerable boxes for the surplus odds and ends of her collection.

Twice Mrs. Newcomb and myself have had the very great pleasure of visits from her to our home, which was then at Dorchester, Massachusetts, and I shall always remember the keen enjoyment of a day spent with her roaming the Blue Hills of Milton with our nets.

In 1904 she wrote me that her collection was becoming too great a care and that if I wished I might have it. What a wonderful thing to have a collection like hers to add to my own modest efforts in that line. I immediately went to New Windsor and together we packed it up and it was sent to my home.

I soon found that I had more Lepidoptera than I could well handle, so the Geometridae were taken by Louis W. Swett, who is working in that group, and the Noctuidae by the American Museum of Natural History, New York City.

The remainder of her collection is now at the Boston Society of Natural History, under the care of its efficient curator, Charles W. Johnson.

Miss Morton begged me not to forget to mention her very dear friends, Mrs. Herring and the late Mrs. Gilbert, both of Plainfield, New Jersey, and the delightful two weeks spent with them at a hotel at Liberty, New York. They used to hire the Liberty stage and go on collecting trips in that beautiful section, where many rare specimens were taken.

Miss Morton has lived an active, industrious life and although she has written very little for scientific publications, her work was of the practical, useful kind and her best efforts were devoted to helping others in their entomological studies and pursuits.

(The photograph from which Plate VIII was made was taken about thirty or thirty-five years ago.)

The Azalea Lace-Bug, *Stephanitis pyrioides* Scott
(*Tingitidae, Hemiptera*).

By EDGAR L. DICKERSON and HARRY B. WEISS.*

(Plate IX.)

For the past several years this tingid has been present in New Jersey, but only recently has it become abundant and widespread enough to do considerable damage. It was originally described by John Scott in his paper "On a Collection of Hemiptera Heteroptera from Japan, Descriptions of Various New Genera and Species," which appeared in the Ann. Mag. Nat. His. (4) XIV, p. 440. 1874. Horvath, in the Ann. Mus. Hung. III. p. 568, 28 (1905) et IV. p. 55. 3 (1906), contributed to synonymy by renaming it *Stephanitis azaleae*. In Van Duzee's check list of the Hemiptera of America, north of Mexico, it appears as *Stephanitis pyrioides* Scott.

*The arrangement of the authors' names is alphabetical only and indicates neither seniority nor precedence.

It has been found by the authors at the following localities in New Jersey: Arlington, Rutherford, Far Hills, Riverton, Palmyra, Springfield, Nutley and New Brunswick, and is also known to occur at Bala, Pennsylvania; Washington, D. C.; Holland and Japan. It was evidently introduced into New Jersey in the egg stage on evergreen azaleas from Japan, as quite a few Japanese azaleas have been imported into New Jersey during the past few years. We have found it infesting the following species and varieties of azaleas: Hinodegeri, Amoena, Ledifolia alba, Benigeri, Yodogawa, Kaempheri, Pontica, Mollis, Indica, Shirogeri, Hatsugeri, Shibori, Amurasaki, Schlippenbachii, etc., the deciduous varieties, however, not being as badly infested as the evergreen ones.

The injury is caused by the nymphs and adults feeding on the under surfaces of the leaves, abstracting the sap and resulting in a discoloration of the foliage on the upper surface. In severe infestations, the leaves become almost white, many of them drying completely and dropping off, and the undersides of the leaves are also disfigured by the excrement of the insects.

The winter is passed in the egg stage and hatching takes place about the latter part of May in central and southern New Jersey. The length of each nymphal stage varies from three to six days, depending on the temperature. About the latter part of June adults appear and egg-laying takes place, this operation extending over an average period of two weeks. These eggs require on an average two weeks for hatching and by the last week in July and first week of August growth is completed and many new adults are present. During the first two weeks of August eggs are again laid and by the middle and last week in September many adults of this brood are present, the over-wintering eggs being deposited at this time and during the first part of October. Adults, mostly females, have been noted lingering on the plants as late as the middle of November. Thus there are three broods in southern New Jersey, the average length of each being about one month. In the central and northern parts of the State there are only two, and a partial third. On account of the extended oviposition

period it is quite possible to find all stages feeding together at the same time.

About the time the maximum number of adults have emerged the proportion of sexes is equal. Later, however, many of the males disappear and about the time egg-laying is well under way the females are in the majority. As it approaches time for the hatching of the eggs the adults lingering on the plants are practically all females. It thus appears that either the females have greater vitality or that the males die soon after copulation. Egg-deposition requires from two to three minutes. The ovipositor is pulled from its sheath and the female touches the surface of the leaf with it until a suitable place is found. It is then thrust into the tissue until the abdomen rests against the leaf and then withdrawn.

EGG & NYMPHAL STAGES.

Egg. Length 0.4 mm., width 0.18 mm. These are smooth, white and flask-shaped, with the neck bent to one side. They are deposited in the leaf tissue along the mid-rib and larger veins, being found as a rule in the younger leaves. Each egg is inserted in the tissue with the cap extending slightly above the leaf surface, each cap being visible as a whitish oval or irregular circular ring. Sometimes, but not always, the cap is covered with a brownish scab-like crust. From one to ninety eggs have been found in a single leaf, most of them being placed irregularly along the mid-rib. In many leaves, the eggs can readily be located by holding the leaf up to the light and examining with a hand lens, each egg appearing as a light oval spot surrounded by a reddish or dark discoloration.

1st Nymphal Stage. Length exclusive of tubercles 0.4 mm. Body elliptical, slightly broadest at middle of abdomen. General color white except tips of ultimate and penultimate antennal segments, bases of legs, line on front of head extending to base of rostrum, middle dorsal surface of abdomen and tubercles on head and abdomen which are brownish. Two tubercles on posterior margin of head, one on vertex in front and between them. One median dorsal tubercle on the 2nd, 5th, 6th and 8th abdominal segments. Antennae three-fifths the length of the body. Rostrum extending to last pair of legs. Eyes lateral, not prominent, consisting of five distinct ommatidia. Antennae and tubercles in this and the following nymphal stages covered with secreting hairs.

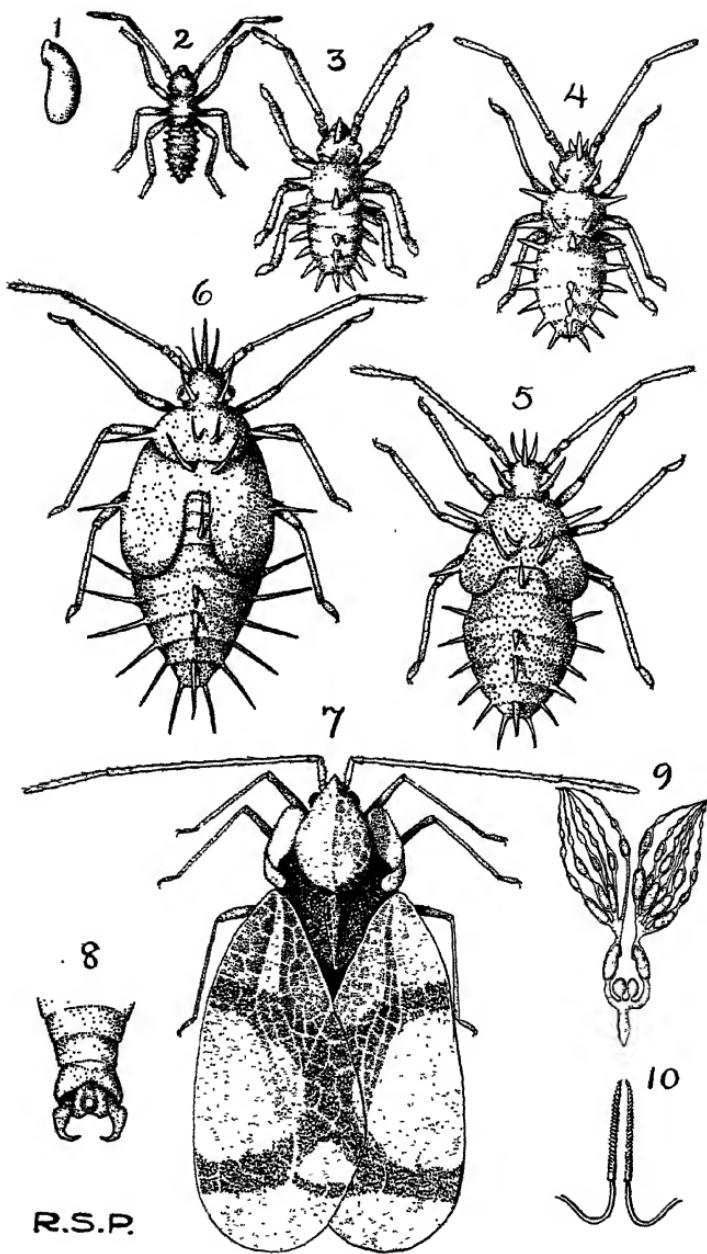
2nd Nymphal Stage. Length exclusive of tubercles 0.55 mm. Body elliptical, color white except tips of ultimate and penultimate antennal

segments, line on front of head, tubercles, bases of legs, dorsal surface of abdomen and bands extending anteriorly near sides of thorax, which are brownish. Tubercles as noted before in first stage, but more pronounced and in addition, single pointed tubercles on sides of pro- and mesothorax, on sides of 4th, 5th, 6th, 7th, 8th, 9th abdominal segments and two minute tubercles on face just below vertex. Rostrum extending to last pair of legs. Eyes similar to those of first nymphal stage. Antennae three-fifths length of body.

3rd Nymphal Stage. Length exclusive of tubercles 0.8 mm. Similar to second stage except that coloring and structure are more pronounced. Body elliptical, color white except tips of ultimate and penultimate antennal segments, line on front of head, bases of legs, dorsal surface of abdomen, posterior lateral sides of thorax, some of posterior and lateral margins of head and tubercles which are brownish. Dorsal surface of abdomen and tubercles darker brown than remainder. Tubercles similar to preceding stage but more pronounced and in addition two white median dorsal tubercles on pro- and mesothorax. Tubercles on sides of mesothorax rest on basal lobes. Eyes similar to preceding stage. Antennae tending toward yellowish white, three-fifths length of body. Rostrum extending to last pair of legs.

4th Nymphal Stage. Length exclusive of tubercles 1.2 mm. Body broadly elliptical. Color white except tips of ultimate and penultimate antennal segments, line on front of head, bases of legs, most of dorsal surface of abdomen, posterior two-thirds of thorax, portions of lateral and posterior margins of head, outer sides of basal segments of antennae, outer surfaces of tarsi, rostrum and tubercles, which are brown. Antennae yellowish brown. Median dorsal tubercles on prothorax white except at tips. Tubercles similar to those of third stage but more pronounced. Lobes of mesothorax more pronounced, covering those of metathorax. Antennae about three-fifths length of body. Rostrum extending to third pair of legs. Eyes consisting of numerous ommatidia.

5th Nymphal Stage. Length exclusive of tubercles 1.8 mm. Body oval. Color: antennae light yellowish brown; line on front of head and portions of lateral and posterior margins of head, posterior margins of pro-thorax, most of meso- and metathorax, basal three-fourths of abdomen, base and tips of wing pads, tubercles, outer surface of basal antennal segments, tips of ultimate and penultimate antennal segments, bases of legs, bases of tarsi, outer surface of rostrum, brown; remainder white in part tinged with brown. Tubercles very pronounced, acuminate. Wing-pads extending to 5th abdominal segment. Eyes more prominent, consisting of numerous reddish ommatidia. Median dorsal elevation on prothorax. Rostrum extending between 2nd and 3rd pair of legs. Antennae almost as long as the body.



AZALEA LACE-BUG, STEPHANITIS PYRIOIDES—DICKERSON AND WEISS.

Adult. This was described by Scott from one example as follows:

Tingis pyrioides. Extremely like *Tingis pyri* in nearly every particular: and therefore it will only be necessary to point out the characters which will separate them.

Tingis pyri Fab. Disk of the elytra from the apex of the rhomboidal cell with 5 transverse rows of irregular meshes.

Tingis pyrioides. Disk of the elytra from the apex of the rhomboidal cell with 3 transverse rows of irregular meshes. Pronotum, lateral margins more upright than in *T. pyri*. Length 1 and $\frac{1}{2}$ line.

As a matter of information the original description of *Tingis pyri* by Fabricius in *Systema Entomologiae* (1775), p. 696, is given as follows:

Acanthia pyri thorace trialato, scutello foliato, elytris reticulatis, basi gibbis.

Habitat in foliorum pyri pagina inferiori, ea maculans. Prof. Herrmann. Caput parvum, albidum. Thorax alis tribus magnis, elevatis, albis, fusco-reticulatis; lateralibus compressis, carinatis, acutis; intermedia globosa, breviora. Scutellum elevatum, foliaceum, acutum, album, macula fusca baseos. Elytra reticulata, alba, fusco-maculata, basi gibba. Pedes albi.

On the accompanying plate will be found figures of the egg, nymphal stages, adult, anal claspers of male, ovipositor and ovaries. Each ovary was found to consist of six tubes, some of which were empty, while others contained mature and immature eggs. The mature eggs in the oviduct showed slight brown discolorations at the upper ends. As shown in the figure, a seminal receptacle was found slightly on the ventral side of each oviduct.

These lace bugs may be controlled on azaleas by spraying with whale oil soap at the rate of 5 or 6 pounds to 50 gallons of water. To be most effective the spraying should take place shortly after the over-wintering eggs have hatched and should be directed against the undersides of the leaves.

EXPLANATION OF PLATE IX.

Stephanitis pyrioides Scott.

Figure 1, egg

Figure 6, 5th stage nymph

Figure 2, 1st stage nymph

Figure 7, Adult

Figure 3, 2nd stage nymph

Figure 8, Anal claspers of male

Figure 4, 3rd stage nymph

Figure 9, Ovaries

Figure 5, 4th stage nymph

Figure 10, Ovipositor.

The Occurrence of the Genus *Monobaeus* Foerster in North America (Hym.).

By A. A. GIRAULT, Glenn Dale, Maryland.

The following species is the first of this genus to be described from North America. The genus, as represented by the new species, has the parapsidal furrows distinct, as is also sometimes (or often) true for *Ormyrus*. The two genera differ in the number of ring-joints only. The species differ much in the sculpture of the abdomen, especially as regards the arrangement of the coarser punctures at the base of the segments. The club is sub-solid, but its articulations are still visible.

Monobaeus hegeli new species.

Female:—Length, 3.00 mm. Abdomen distinctly longer than the rest of the body, substyleate at apex.

Very similar to *Ormyrus ventricosus* Ashmead but more robust and the abdomen, besides the usual median carina dorsad and the scalloped cross-ridges, bears a single row of coarse punctures at base of segments 4 and 5 and is densely pin-punctate instead of scaly, while segment 6 is densely thimble-punctate. Also the propodeum is bicarinate at the meson instead of tricarinate as in *ventricosus*. Funicle 1 hemispherical, shortest, over thrice the size of the usual ring-joint; other funicle joints a little wider than long. Body downy. Types compared.

Described from one female from Michigan (C. P. Gillette).
Type: Catalogue No. 20239, U. S. N. M., the specimen on a tag, an antenna on a slide.

Perhaps this genus may grade into *Ormyrus*; that is, the second ring-joint be larger and larger in relation to the first, so that it is no longer possible to distinguish one from two ring-joints in some cases. Then the two genera must be merged as Mayr has done.

A Correction in Spelling (Col.)

Mr. Edw. M. Ehrhorn, Superintendent, Division of Entomology, Territory of Hawaii, has recently called my attention to the wrong spelling of *Acythopeus* in my paper on "Some Unusual Orchid Insects," in the "News" for January, 1917, where it appears as *Acyphotheus*. I was misled in this by following the spelling in Mr. Champion's paper in the "Entomologist's Monthly Magazine" for September, 1916, where it also appears as *Acyphotheus*, evidently due to a printer's mistake.—HARRY B. WEISS.

Some Critical Notes on the Giant Katydid Forming the Group Steirodontia (Orthoptera, Tettigoniidae, Phaneropterinae).

By JAMES A. G. REHN, Academy of Natural Sciences, Philadelphia, Pa.

(Plate X.)

The notes gathered together in this paper have accumulated while studying the material of this group contained in certain large South and Central American and West Indian series of Orthoptera, now in our hands for determination. The remarks are grouped under the genera considered, but, aside from the revision of the forms of the *Stilpnochlora marginella* group, they are not presented as exhaustive or final, instead being intended merely as suggestions, to help the future student who has before him more material of this group of most interesting and striking species.

STILPNOCHLORA Stål.

1873. *Stilpnochlora* Stål, Öfvers. K. Vetensk.-Akad. Förhandl., 1873,
No. 4, p. 40.
1906. *Microcentrum* Kirby (not of Scudder, 1862, as restricted),
Synon. Catal. Orth., II, p. 455.

Genotype: *Phylloptera marginella* Serville (by original designation).

Kirby is quite in error in considering *Microcentrum* the proper name for this genus. It is in part *Microcentrum* of Scudder, but the genotype of the latter genus was properly selected by us as *affiliatum* Scudder (= *rhombifolium* Saussure).¹ As shown at the time of our selection of the genotype, Kirby selected as genotype of Scudder's genus a species not included in the genus by Scudder, so his fixation is erroneous. The action taken by us retains the names in their time-honored positions and is in accord with Article 30 of the Revised International Code of Zoological Nomenclature.

The known species of the genus *Stilpnochlora* are all before us at present, with the exception of Saussure and Zehntner's *ovalifolia*, which was described from Brazil,² and concerning

¹ Proc. Acad. Nat. Sci. Phila., 1908, p. 398 (1908).

² Biol. Cent.-Amer., Orth., I., p. 369 (1898).

which we can say nothing. The other forms fall quite naturally into four divisions, which in a linear fashion we would arrange as follows: *S. thoracica* Serville (= *tolteca* Saussure and authors); the *marginella* group, comprising *marginella* (Serville), *couloniana* (Saussure), *quadrata* (Scudder) and *laurifolium* (Linnaeus); *S. azteca* (Saussure); and last, *S. incisa* Brunner.

We would consider *S. thoracica* more divergent from the Steirodontid genera following *Stilpnochlora* than the other groups of the genus, and *S. incisa* nearer them, with *azteca* relatively close to it, both having a short inflated type of pronotum and a tendency of the lateral margins of the pronotal disk to be elevated. The *marginella* group clearly holds an intermediate position. At this writing we have no important information to give on any of the sections of the genus except the *marginella* group, which is a very plastic assemblage of four species, the relationships of which were not comprehended previously.

Stilpnochlora marginella Group.

This group, the greater portion of which was formerly considered to represent a single widely distributed species, for which the name *marginella* was used, is composed of four species, two of which—*marginella* and *laurifolium*—are quite distinct from each other and from the other forms—*quadrata* and *couloniana*—which are much more closely related.

Serville's *marginella*³ was described from the Cape of Good Hope, of course in error, as all the members of the genus are American. There is nothing sufficiently diagnostic in its description to enable us to definitely place the name, but it is very probable he had Brazilian material, as much of his South American material came from that region, and Stål, the first author to comment on Serville's species, associated Brazilian material with it. In consequence of this we feel warranted in restricting Serville's name to the form of eastern Brazil and the Guianas, at least until an examination of the Serville material, if still extant, can be made. Saussure, in 1861, described the Cuban form of this group as *Phylloptera couloni*.

³ Hist. Nat. Ins., Orth., p. 405 (1839).

ana,⁴ while, in 1869, Scudder described *Steirodon quadratum*⁵ from Guayaquil, Ecuador, which appears to us to be the form of this species group found in Mexico, Central America and northwestern South America.

Linnaeus, in 1758, gave the name *Gryllus (Tettigonia) laurifolius*⁶ to the insect figured by Sloane in his Natural History of Jamaica,⁷ which is the most distinct member of this species group.

The distribution of these forms is most interesting and to a measure suggestive of the relationship of certain faunas. The eastern Brazilian species, *marginella* (Serville), ranges from at least as far south as the State of São Paulo, north to Trinidad and Surinam. The Central American form, *quadrata* (Scudder), covers an area extending from central Mexico south to western Ecuador and probably Peru (Saussure as *marginella*), while along the north coast of South America it apparently extends eastward, as it occurs in Trinidad with *marginella*. The Cuban *couloniana* is known only from that island and Florida, while *laurifolium* is limited to Jamaica. The close affinity of the Mexican and Cuban forms is additional evidence of the Mexican influence in the Greater Antilles.

The chief feature which distinguishes the species is the form of the stridulating field of the tegmina of the male. This is least extensive, with its free margin almost regularly arcuate and hardly angulate, and having a short stridulating vein, in *marginella*; in *couloniana* the field is broader, with a rounded obtuse angulation at the extremity of the vein, which is somewhat heavier and longer; in *quadrata* the breadth of the field is distinctly greater, the margin is more decidedly obtuse-angulate and but little rounded, while the stridulating vein is more elongate; finally, in *laurifolium* the field is very broad, the margin is more decidedly angulate and the stridulating vein quite long and greatly thickened and elevated.

The pronotum of the male shows a corresponding increase

⁴ Révue et Magasin de Zoologie, 2e ser., XIII, p. 128 (1861).

⁵ Proc. Boston Soc. Nat. Hist., XII, p. 331 (1869).

⁶ Syst. Nat., X ed., p. 429 (1758).

⁷ II, p. 201, pl. 236, figs. 1 and 2 (1725).

in width as the stridulating field widens, while in the female this difference in the form of the pronotum is apparently the only feature which will readily separate the forms. Females of *couloniana* and *quadrata* are very similar, so much so that they are sometimes extremely hard to separate. We have given figures of the principal differences separating the species, as they are so comparative that their use in a key would be difficult and at most unsatisfactory. We find no other features of sufficient importance to use as diagnostic features.

Stilpnochlora marginella (Serville). Plate X, fig. 1.

1839. *Phylloptera marginella* Serville, Hist. Nat. Ins., Orth., p. 405.
["Cape of Good Hope."]

1869. *Phylloptera magnifolia* Walker, Catal. Derm. Salt. Brit. Mus.,
II, p. 377. (Part.) [Brazil; Guayaquil.]

Trinidad. (F. W. Urich.) One male. [A. N. S. P.]

Surinam. V, 1881. (C. G. Hering.) One female. [U. S. N. M.]

Cayenne. One male. [A. N. S. P.]

Peixe Boi, east of Pará, Pará, Brazil. XI to XII, 1907. (H. B. Merrill.) Two females. [A. N. S. P.]

Igarapé-assú, Pará, Brazil. (H. S. Parish.) One male.
[A. N. S. P.]

Bonito, Pernambuco, Brazil. XI, 1883. (A. Koebele.) One male. [U. S. N. M.]

Piracicaba, São Paulo, Brazil. One male, one female. [Hebard Cln.]

The species has been previously recorded from as far south as Rio de Janeiro, Brazil. This form is smaller than the average of the other types of this group. It has the narrowest pronotum and stridulating field of the male tegmina and the general form is faintly more compressed than in the other species. The specimens from Piracicaba have the lateral lobes of the pronotum faintly narrower in proportion to their depth. The male stridulating field is identical in its important features with the north Brazilian males. We consider these specimens to represent the extreme condition of *marginella*.

- Stilpnochlora couloniana* (Saussure). Plate X, figs. 2 and 7.
1861. *Phylloptera couloniana* Saussure, *Révue et Magasin de Zoologie*,
2e ser., XIII, p. 128. [Cuba.]
1862. *M[icrocentrum] thoracicum* Scudder (not *Steirodon thoracicus*
Serville, 1831), *Boston Journ. Nat. Hist.*, VII, p. 447. [Tor-
tugas, Florida.]

Cuba. One male, two females. [Hebard Cln.]
Cabañas, Pinar del Rio, Cuba, IX, 5 to 8, 1913. One male.
[A. M. N. H.]

Santiago, Oriente, Cuba, X to XII, 1913. One male, one
female. [A. N. S. P.]⁸

Quantanamo, Oriente, Cuba. VIII, 7, 1913. (C. T. Ramsden,
at light.) One female. [A. N. S. P.]

This species is only known from Cuba, the Isle of Pines and
the peninsula of Florida. In Cuba it seems to occur over the
whole island and in Florida it occurs as far north as Gaines-
ville. Elsewhere a considerable number of Floridan refer-
ences have been given, which it is unnecessary to discuss in
this summary. The affinity of *couloniana* with *quadrata* is
marked and its origin is to our mind clearly evident. Its dis-
tribution and affinity is comparable to the distribution of *Man-
toida maya* and *Phrixia maya*.

The tegmina of Cuban specimens of this species are broad-
er proportionately than in *quadrata*, and in the female sex
this is the one evident feature to separate the two forms. In
Florida material, however, the tegmina are somewhat narrow-
er and the females are almost indistinguishable from Mexican
individuals. The Florida males, however, are fully typical of
couloniana.

- Stilpnochlora quadrata* Scudder. Plate X, figs. 3 and 6.
1869. *Steirodon quadratum* Scudder, *Proc. Boston Soc. Nat. Hist.*,
XII, p. 331. (April, 1869.) [Guayaquil, Ecuador.]
1869. *Phylloptera magnifolia* Walker, *Catal. Derm. Salt. Brit. Mus.*,
II, p. 377. (Part.) (Not earlier than October, 1869.) [Bra-
zil; Guayaquil.]

Monte Redondo, Costa Rica. III, 30, 1895. (C. F. Under-
wood.) One male. [Hebard Cln.]

⁸ Previously recorded by us (*Sec. Rep. Cent. Exper. Sta. Cuba*, p.
210, 1909) as *S. marginella*.

Cartago, Costa Rica. IX, 19, 1909. (P. P. Calvert; well sustained flight around electric light in plaza.) One male. [A. N. S. P.]

Cauca, Colombia. (Fortunato Bonis.) Two females. [A. N. S. P.]

Medellin, Colombia. IX, 1912. (Fr. A. Maria.) One male. [Hebard Cln.]

Jimenez, Colombia, elev. 1600 feet. VII, 1907. (M. G. Palmer.) One male. [A. N. S. P.]

Caparo, Trinidad. VI, 1913. (S. M. Klages.) One male, [A. N. S. P.]

All previous records of *marginella* made by us on the basis of Mexican and Costa Rican material relate to this species. From our present knowledge *quadrata* has the widest distribution of any form of the genus. It occurs from north-central Mexico (Tepic) and northern Yucatan south to at least Ecuador and probably Peru, east to Trinidad, where its range touches or overlaps that of *S. marginella*. At its northern limit the range extends to the limit of mainland connections (Yucatan) in the direction of its very near ally, the Cuban *couloniana*.

There is much size variation in the species, some in the general form of the pronotum, and to a lesser degree in the pro-natal outline, but the male sex is not difficult to separate from *couloniana*. The females, on the other hand, are much more troublesome, as Floridan female individuals of *couloniana* are almost indistinguishable from that sex of *quadrata*. On close comparison it will be seen that the females of *quadrata* have slightly more elongate tegmina, with the sutural margin showing a less distinct angle at the distal fourth and the marginal field more regularly attenuate. Cuban *couloniana* females, which show an appreciably wider tegmen, are more readily differentiated.

Stilpnochlora laurifolium (Linnaeus). Plate X, fig. 4.

1758. [*Gryllus (Tettigonia)*] *laurifolius* Linnaeus, Syst. Nat., X ed., p. 429. ["Indiis."]

1878. *Stilpnochlora coulonia* Brunner (not *Phylloptera couloniana* Saussure), Monogr. der Phaneropt., p. 359. [Jamaica.]

Cinchona, Jamaica. II, 26, 1911. (J. A. Grossbeck.) One male. [Amer. Mus. Nat. Hist.]

Montego Bay, Jamaica. III, 1911. (J. A. Grossbeck.) One male. [Amer. Mus. Nat. Hist.]

Montego Bay, Jamaica. XII, 1913, and III, 1914. (C. G. Hussey.) Three males. [Hebard Cln.]

This is the most striking member of the genus, and it is found in a relatively restricted and most isolated habitat for a *Stilpnochlora*. Quite curiously it has not been previously recognized from material since Sloane's drawing (the basis of *laurifolius* Linnaeus), aside from Brunner's comments on a male from Jamaica which showed differences from *marginella*. Sloane's original figure was based on a specimen which "came amongst some Scotch Grass, brought from the Caymanes for the Horses, and was taken in the Stable and kept alive on Sugar and Water for some Time."⁹ It is very probable the specimen was a native Jamaican insect, which found a congenial resting place on the Cayman grass. Linnaeus' name was erroneously used for a great many years for a North American species of *Microcentrum*, a misuse apparently due to the failure of authors to verify the source of the name. The figure of Sloane is clearly a *Stilpnochlora*, and as far as can be determined represents the present species.

The species has a development of the stridulating field of the male, which is very great; in fact, it is the most striking thing about that sex of the insect. We have not examined the female and can make no comment on that sex, as it is apparently unknown at this writing.

The measurements (in millimeters) of two representative males of this species are as follows:

	Montego Bay Jamaica XII, 1913	Montego Bay Jamaica III, 1914
Length of body	31	33
Length of pronotum	9.5	9.5
Greatest caudal width of pronotal disk.....	8.3	8.4
Length of tegmen	60	59.5
Greatest width of tegmen	20.2	19.6
Greatest width of stridulating field of tegmen	9.4	9.5
Length of caudal femur	32.3	32.5

⁹ Nat. Hist. Jamaica, II, p. 201, pl. 236, figs. 1 and 2 (1725).

STEIRODON Serville.

Kirby's treatment of the specific names under this genus is incorrect, as he completely ignores Stål's examination¹⁰ of the Linnean material of *Gryllus (Tettigonia) citrifolius*.

The original material, according to Stål, belongs to the genus *Posidippus*. As this material was examined by a competent student its importance completely overshadows the Roesel figure¹¹ referred to by Linnaeus, which quite clearly depicts a member of the genus *Peucestes*.

Kirby, however, apparently without any justification, considers Linnaeus' species to be a *Steirodon*. The above explanation will show the error of his association.

As we have already shown,¹² the genus *Steirodon* must have as its type, there designated some months before Kirby's indication, *Phylloptera citrifolia* Thunberg (not *Gryllus (Tettigonia) citrifolius* Linnaeus), the original material of which is a *Steirodon* according to Stål, who renamed it *Steirodon calidum*. The *Locusta citrifolia* of DeGeer¹³ is clearly a *Posidippus*, while Stoll's *Locusta citrifolia*¹⁴ is with equal certainty a *Peucestes*.

The genera *Steirodon* and *Peucestes* are extremely close, in fact females of *Peucestes dentatus* are quite liable to be mistaken for species of *Steirodon*, as the distal ramus of the median vein of the tegmina in the four females seen reaches the apex of the tegmina, a feature supposed to be characteristic of *Steirodon*. Males of the same species, however, do not show this peculiarity, the ramus reaching the sutural margin. More material may show the necessity of uniting *Peucestes*, in whole or at least in part, with the older *Steirodon*.

PEUCESTES Stål.

For remarks on the close relationship of *Peucestes* and *Steirodon* see above under the latter genus.

Peucestes striolatus Brunner.

1878. *P[eu]cestes] striolatus* Brunner, Monogr. der Phaneropt., p. 366.
[Pernambuco and Bahia, Brazil; Panama; Peru.]

¹⁰ Recens. Orthopt., II, p. 45 (1874).

¹¹ Insect. Belust., II, p. 107, pl. XVI, fig. 1.

¹² Proc. Acad. Nat. Sci., Phila., 1905, p. 807 (1906).

¹³ Mém. Ins., III, p. 437, pl. 37, fig. 3 (1773).

¹⁴ Natuur. Afbeeld. Beschr. etc., Zabelspr., p. 11, pl. IVa, fig. 12 (1813).

Chanchamayo, Peru. Three males, four females. [A. N. S. P.]

The Chanchamayo series clearly belongs to this species, but may represent a new geographic race characterized by the greater compression of the pronotum.

Peucestes dentatus Stål.

1874. *P[eu]cestes dentatus* Stål, Recensio Orthopt., II, p. 45. [Panama; Cayenne.]

Orotina, Costa Rica. X, 11, 1915. (A. Alfaro; night.) One female. [A. N. S. P.]

Costa Rica. Two females. [A. N. S. P. and Hebard Cln.]

Panamá. One male. [U. S. N. M.] One female. [Hebard Cln.]

Cauca, Colombia. One male. [A. N. S. P.]

The species *dentatus* appears to us to be quite distinct from *coronatus*. Saussure and Zehntner seem to have had the best conception of the species of this genus and their relationship.

The genus *Steirodon* is dangerously close to this species, as we have already remarked above. Females of this species, as we understand it, have the distal rami of the median vein of the tegmina reaching to apex.

The Panamá male is slightly different from the Cauca individual, but the differences are not specific.

Peucestes championi Saussure and Zehntner.

1898. *Peucestes championi* Saussure and Zehntner, Biol. Cent.-Amer., Orth., I, p. 371, pl. XVIII, figs. 6 to 9. [Panzos, Vera Paz, Guatemala; Cachi (Caché), Costa Rica.]

Cachi, Costa Rica, 3500 feet elevation. (C. H. Lankester.) One male. [A. N. S. P.]

This specimen is perfectly typical of the species. We do not feel sure that Saussure and Zehntner's sex association is correct, as the female, from the figure, seems quite different. We have, however, no evidence on this except that furnished by the figures.

Generic divisions united by Brunner under Posidippus.

A. Cephalic margin of pronotal disk with median tooth. Tegmina proportionately broad; marginal field equal to one-half tegminal width at proximal third. Median and caudal tibiae not distinctly

expanded proximad. (Fastigii of the vertex and face subequal in width. Pronotal lateral margins regularly crenato-dentate. Cephalic tibiae with foramina narrowly open on cephalic face, broadly open on caudal face) *Posidippus* Stål.

(Genotype: *Gryllus (Tettigonia) citrifolius* Linnaeus.)

AA. Cephalic margin of pronotal disk without median tooth. Tegmina proportionately narrow, more lanceolate; marginal field not equal to one-half tegminal width at proximal third. Median and caudal tibiae distinctly expanded or even lamellate proximad (except in *Frontinus degeerii* and *rarospinulosus*).

B. Fastigium of the vertex produced cephalad of the facial fastigium, rounded at the extremity; facial fastigium acuminate, narrower than the fastigium of the vertex. Pronotum with lateral margins of disk elevated, crassly dentate. Stridulating field of male tegmina with free margin sinuate. Cephalic tibiae with foramina rimato-conchate on both faces. Median and caudal tibiae compressed, decidedly lamellate in proximal half.

Cnemidophyllum new genus.

(Genotype: *Posidippus lineatus* Brunner.)

BB. Fastigii equally produced or the fastigium of the face projecting cephalad of that of the vertex, in width either subequal or the facial fastigium twice as wide as that of the vertex, both bituberculate. Pronotum with lateral margins not distinctly elevated, finely crenulate. Stridulating field of male tegmina with free margin arcuate. Cephalic tibiae with foramina rimato-conchate on cephalic face and open on caudal face. Median and caudal tibiae compressed, not decidedly lamellate.

C. Fastigii equally produced, in width subequal.

Frontinus Stål.

(Genotype: *F. degeerii* Stål.)

CC. Fastigium of the face projecting cephalad of that of the vertex, the facial fastigium twice as wide as that of the vertex, both bituberculate..... *Steirodonopis* Scudder.

(Genotype: *S. bilobata* Scudder.)

POSIDIPPUS Stål.

1874. *Posidippus* Stål, Recens. Orthopt., II, pp. 20, 45.

Genotype: *Gryllus (Tettigonia) citrifolius* Linnaeus.

The restricted genus *Posidippus* certainly includes, in addition to the genotype, *P. validus* Saussure and Zehntner, while of the exact generic position of *stål'i*, *dohrni* and *irregulariter-dentatus* Brunner and *barellus* Pictet we cannot speak at present, having examined no material of these forms, all of which have been placed in *Posidippus* as generally understood.

Posidippus citrifolius (Linnaeus).

1758. [*Gryllus (Tettigonia)*] *citrifolius* Linnaeus, Syst. Nat., ed. X, p. 429. ["Indiis."]

1869. *Steirodon dentiferum* Walker, Catal. Dermapt. Brit. Mus., II, p. 391. [Unknown locality.]

Bogotá, Colombia. Two females. [U. S. N. M.]

Chanchomayo, Peru. One male, one female. [A. N. S. P.]

Contamano, Rio Ucayali, Peru. X to XII, 1912. Two males.

[A. N. S. P.]

Porto Velho, Rio Madeira, Brazil. (Mann and Baker; M. Bolton.) Two males. [A. N. S. P.]

Rio Una, forty-six miles south of Bahia, Brazil. (A. de Lacerda.) One male. [M. C. Z.]

Piracicaba, São Paulo, Brazil. Three females. [Hebard Clin.]

This specific name has been variously considered to belong to members of three genera, i. e. *Steirodon*, *Peucestes* and *Posidippus*, but all question of the proper association of it should be set at rest by Stål's examination of the Linnean material. Regardless of the Roesel figure, quoted by Linnaeus, which clearly represents a species of *Peucestes*, the testimony of Linnaeus' material, which belongs to *Posidippus*, as here understood, is the measure of proof. The synonymy of *dentiferum* is given on the authority of Kirby, who examined the Walkerian material and so associated it.

The material now before us shows the species has some variation in the exact form of the free margin of the stridulating field of the tegmina of the male and, as usual in the group, in the exact number of the lateral marginal dentations on the pronotum. There is also an appreciable, though slight, amount of variation in the compression of the lateral pronotal carinae. This latter feature is correlated with the degree of concavity of the cephalic margin of the disk of the same. These variations appear to be almost entirely individual.

The species is now known to range from the region of Bogotá to Surinam and eastern Brazil, south to eastern and central Peru.

Posidippus validus Saussure and Zehntner.

1898. *Posidippus validus* Saussure and Zehntner, Biol. Cent.-Amer., Orth., I, p. 373, pl. XVIII, figs. 10 and 11. [Chontales, Nicaragua.]

Panamá. (Drs. G. W. and W. Nelson.) One male. [U. S. N. M.]

Hacienda Cincinnati, Santa Marta, Colombia, 4000 to 5000 feet elevation. VII, 1913. (M. A. Carriker, Jr.) One female. [Hebard Cln.]

These specimens are perfectly typical of *validus*, which is readily separated by the characters given by Saussure and Zehntner. The features of the stridulating field of the tegmina of the male we are unable to compare with *citrifolius*, as the single available individual of that sex of *validus* has that area broken. The present female is slightly under the original measurements.

The species is seen to range from Nicaragua to northern Colombia.

CNEMIDOPHYLLUM¹⁵ new genus.

1891. *Posidippus* Brunner, Verh. K.-k. Zool.-botan. Gesell. Wien XLI, pp. 183, 184. (Part.)

Genotype: *Posidippus lineatus* Brunner.

Form compressed. Eyes ovato-globose in basal outline; fastigium of vertex narrow, compressed, produced, moderately declivit, sulcate, rounded at apex; fastigium of face covered by fastigium of vertex, very narrow. Pronotum with disk concave; cephalic margin non-dentate; lateral margins moderately elevated crasso-dentate; disk expanding in width caudad. Tegmina lanceolate; sutural margin straight for the greater portion of its length; marginal field equal to two-fifths of the total tegminal width; stridulating field of male broad, free margin sinuate, stridulating vein robust, elongate. Cephalic femora with four spines on ventro-cephalic margin; cephalic tibiae inflated proximad, foramina rimato-conchate on both faces; median tibiae greatly compressed and lamellate expanded on proximal half, margins of expansion spined. Caudal femora simple, ventral margins spined; caudal tibiae greatly

¹⁵ From κνημίς *greaves* and θυλλον *leaf*.

compressed and lamellate expanded on proximal one-half, margins of expansion spined. Mesosternal lobes acute-angulate. Metasternal lobes broadly rounded acute-angulate.

This genus includes, as far as we know, only the genotypic species. Its form is very striking and it is clearly defined from *Posidippus*, as well as from the aberrant genera *Frontinus* and *Steirodonopis*.

Cnemidophyllum lineatum (Brunner). Plate X, figs. 5, 8 and 9.
1891. *Posidippus lineatus* Brunner, Verhandl. K.-k. Zool.-botan. Gesell. Wien, XLI, pp. 183, 184. [Upper Amazons.]

Contamano, Rio Ucayali, Peru. X to XII, 1912. One male.
[A. N. S. P.]

This remarkable species has been sufficiently described by Brunner, than whose type our individual is slightly smaller. As the present specimen has been dried from alcohol it has lost all its original coloration, excepting the dark markings, which are distinctly indicated and disposed as described by Brunner. The minute striolations of the tegmina are also very faintly indicated.

The species is known only from the two records.

FRONTINUS Stål.

1874. *Frontinus* Stål, Recens. Orthopt., II, pp. 20, 46.

Genotype: *Frontinus degeerii* Stål.

We feel that no useful purpose is served in longer retaining within the genus *Posidippus*, the well defined species which constitute this and the following groups. In detailed characters they are as clearly defined as any of the allied genera, while their general appearance is so distinct they are easily recognized. The policy of Brunner was to consider them members of *Posidippus*.

From the related *Steirodonopis*, Stål's genus can be readily separated by the fastigii being sub-equal in width and length, while (in *degeerii* at least) the stridulating field of the male tegmina is broad and extensive, with the stridulating vein heavy, arcuate and sub-transverse. This genus includes *raro-spinulosus* Brunner in addition to the genotypic species.

Frontinus degeerii Stål. Plate X, fig. 11.

1874. *Frontinus degeerii* Stål, Recens. Orthopt., II, p. 46. [Surinam.]

Costa Rica. (C. F. Underwood.) One male. [Hebard Cln.]

This specimen fits the description of *degeerii* more closely than it does that of the allied *rarospinulosus*, but the acquisition of Guianan material may show it to be different. Unfortunately at this writing no topotypic material is available.

This is the first Central American record of a species of this genus.

STEIRODONOPIS Scudder.

1875. *Steirodonopis* Scudder, Proc. Boston Soc. Nat. Hist., XVII, p. 259.

Genotype: *Steirodonopis bilobata* Scudder.

An examination of the unique type of Scudder's species enables us to associate his genus, which was ignored by some European students of this group. Quite evidently his work was done well within the year 1874, as the paper containing it was presented for publication December 16th, of that year. However, the date of actual publication of Scudder's genus is March, 1875.

From *Frontinus* the present genus can be very easily distinguished by the frontal fastigium being twice as wide as the fastigium of the vertex, the former projecting cephalad of the latter, while the stridulating field of the male tegmina is narrow, with the stridulating vein weak, nearly straight and oblique. In addition to *bilobata*, the genus contains *brunneri* Bolivar, which, however, may be identical with Scudder's species.

Steirodonopis bilobata (Scudder). Plate X, fig. 10.

1875. *Steirodonopis bilobata* Scudder, Proc. Boston Soc. Nat. Hist., XVII, p. 260. [Peruvian Marañon.]

1878. *P[osidippus] fastigiosus* Brunner, Monogr. der Phaneropt., p. 370. [Quito, Ecuador.]¹⁰

1915. *Steirodonopsis* (sic) *scudderii* Bruner, Ann. Carneg. Mus., IX, p. 317. [Province of Sara, Bolivia.]

¹⁰ Doubtless Quito was the point from which the specimen was received, although there is no doubt in our minds but that, along with birds and other natural objects, it was brought to Quito from the eastern part (Oriente) of Ecuador, or an adjacent portion of Peru or Colombia. Bogotá, Colombia, served for many years as such a distributing point for bird skins, as is well known to students of South American birds. Our opinion as to the true original locality of the typical material is re-enforced by Brunner's latest reference to material of the species from the upper Amazons.

Bartica, British Guiana. II, 12, 1913. (H. S. Parish.) One male. [A. N. S. P.]

Peruvian Marañon. One male, *type*. [M. C. Z.]

Chanchomayo, Peru, 1000 meters elevation (two specimens.) Two with no date; others II and V, 1910. Three males, two females. [A. N. S. P.]

As we have said above, the type of Scudder's species is before us, a unique male, and there is no doubt in our minds as to the synonymy of Brunner's *fastigiosus*. Brunner's *Steirodonopsis* (sic) *scudderii*, from the Province of Sara, Bolivia, appears to us to be only a small specimen of *bilobata*; in fact, the Bartica male here recorded is but faintly larger than his measurements. The material before us would fully fit his description. Regarding Bolivar's *Posidippus brunneri*¹⁷ we cannot speak with such certainty, as the description is not as conclusive. It is certainly very close, if not identical, with the present species.

The number of spines on the dorsal margins of the median tibiae vary considerably in this species, often greatly on the two limbs of the same individual. Our specimens show the following count:

	Dorso-cephalic margin	Dorso-caudal margin
♂ Bartica, British Guiana	<u>3</u> 3	<u>4</u> 5
♂ Peruvian Marañon, <i>type</i>	<u>3</u> other tibia missing	<u>4</u>
♂ Chanchomayo, Peru	<u>2</u> 2	<u>4</u> 6
♂ Chanchomayo, Peru	<u>3</u> 5	<u>3</u> 6
♀ Chanchomayo, Peru	<u>3</u> 1	<u>5</u> 6

The range of the species is almost covered by the records given above. The previous records were all from the upper Amazonian region, except the certainly erroneous Quito one, upon which we have already commented, and Bruner's records of the synonymous *scudderii* and *fastigiosus* from the Province of Sara, Bolivia.

¹⁷ An. Soc. Espan. Hist. Nat., X, p. 484 (1881). [Napo, Ecuador.]

EXPLANATION OF PLATE X.

- Stridulating field of the sinistral tegmen of male (x 2).
 Fig. 1—*Stilpnochlora marginella* (Serville). Cayenne.
 Fig. 2—*Stilpnochlora couloniana* (Saussure). Santiago, Cuba.
 Fig. 3—*Stilpnochlora quadrata* (Scudder). Jimenez, western Colombia.
 Fig. 4—*Stilpnochlora laurifolium* (Linnaeus). Cinchona, Jamaica.
 Fig. 5—*Cnemidophyllum lineatum* (Brunner). Contamano, Rio Ucayali, Peru.
 Lateral outline of tegmen of male (x 1½).
 Fig. 6—*Stilpnochlora quadrata* (Scudder). Cauca, Colombia.
 Fig. 7—*Stilpnochlora couloniana* (Saussure). Santiago, Cuba.
 Fig. 8—*Cnemidophyllum lineatum* (Brunner). Lateral view of male. Contamano, Ucayali, Peru (x 1¾).
 Fig. 9—*Cnemidophyllum lineatum* (Brunner). Lateral view of fastigium of male. (Greatly enlarged.) a—base of antennae.
 Fig. 10—*Steirodonopis bilobata* Scudder. Dorsal outline of fastigii. Male. (Greatly enlarged.)
 Fig. 11—*Frontinus degenerii* Stål. Dorsal outline of fastigii. Male. (Greatly enlarged.)
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An Aid in the Entomology of New Jersey.

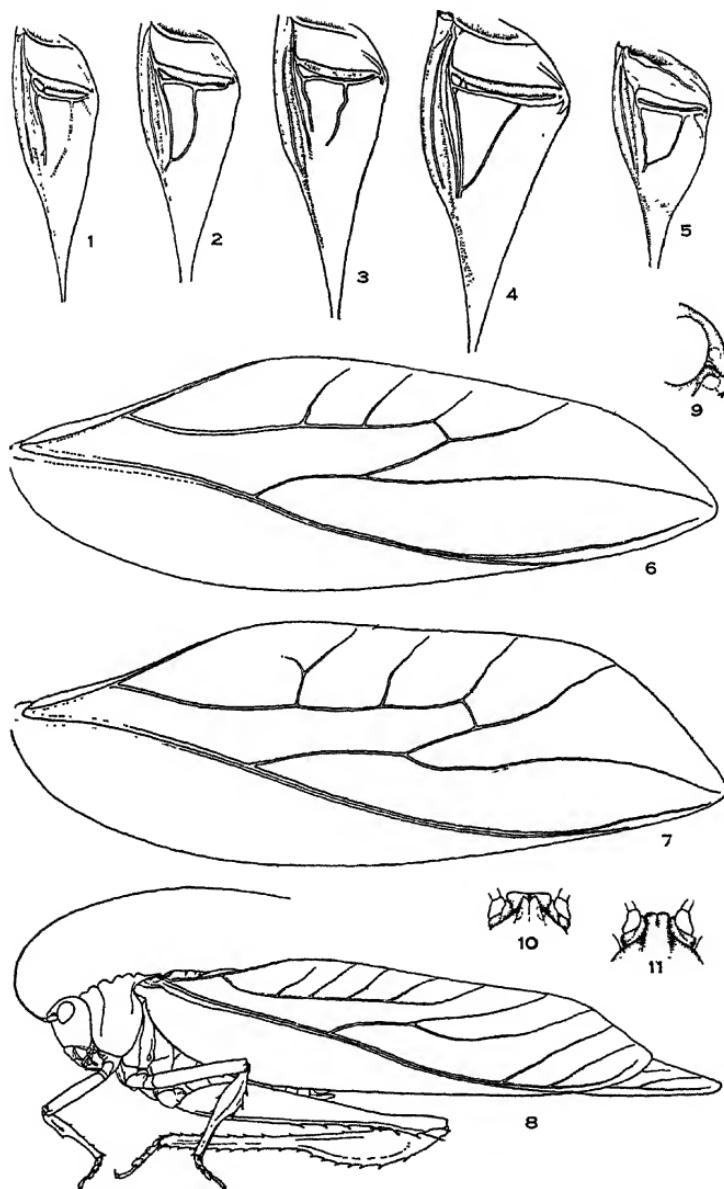
Dr. John W. Harshberger, Professor of Botany in the University of Pennsylvania, Philadelphia, has just published an attractive volume, "The Vegetation of the New Jersey Pine-Barrens An Ecologic Investigation" (Philadelphia, Christopher Sower Co., 1916. 8vo., pp. xi, 329. 284 figs., folding map). This is, of course, essentially a botanical work, which supplements Stone's "The Plants of Southern New Jersey," issued in 1911 by the New Jersey State Museum, "including only that which has not been mentioned by Stone, or in a very casual and unemphatic way." Although there are three pages of "Notes on a few insect galls of the pine barrens," Dr. Harshberger's book will be chiefly of interest to entomologists in the vegetative background which it furnishes for the study of the rich insect fauna of New Jersey.

Data on the Far Southwestern States Wanted (Lep.).

The Entomological Department of the Southwest Museum (Los Angeles, California) is engaged in the compilation of a check list of diurnal Lepidoptera occurring in the Southwest. The territory includes Colorado, New Mexico, Arizona and California. It is planned particularly to secure definite data as to the exact locality of occurrence and month of greatest abundance of all the rarer and more localized forms, namely those which are restricted in range.

With this list it is also planned, if possible, to include a directory of Entomologists residing in the four States named.

The Museum will appreciate data from all collectors having material from the territory in question. Communicate with DR. JOHN COMSTOCK, 1275 Bellevue Avenue, Los Angeles, or with the Entomological Department, Southwest Museum, Avenue 46 and Marmion Way, Los Angeles, California.



GIANT KATYDIDS—REHN.

- | | | |
|--------------------------------------|-------------------------------------|--------------------------------------|
| 1.— <i>Stilpnochlora marginella.</i> | 5.— <i>Cnemidophyllum lineatum.</i> | 9.— <i>Cnemidophyllum lineatum.</i> |
| 2.— " <i>couloniana.</i> | 6.— <i>Stilpnochlora quadrata.</i> | 10.— <i>Steirodonopsis bilobata.</i> |
| 3.— " <i>quadrata.</i> | 7.— " <i>couloniana.</i> | 11.— <i>Frontinus degeerii.</i> |
| 4.— " <i>laurifolium.</i> | 8.— <i>Cnemidophyllum lineatum.</i> | |

New North American species of Dolichopodidae (Dip.).

By M. C. VANDUZEE, Buffalo, New York.

Key to the North American Species of Mesorhaga.

- | | |
|--|-------------------|
| 1 Femora wholly yellow; (females) | 5 |
| Femora more or less black..... | 2 |
| 2 All tibiae and tarsi black or brown (fore pair somewhat yellowish
in the females) | nigripes Ald. |
| Tibiæ yellow (males) | 3 |
| 3 Hypopygium with small yellow appendages..... | albiciiliata Ald. |
| Hypopygial appendages fully one-third as long as the hypopy-
gium | 4 |
| 4 Fore and middle femora black or green but yellow at base and
tip | caudata V. D. |
| Fore femora wholly yellow, middle femora black at base on the
lower side | varipes sp. nov. |
| 5 All coxæ black | albiciiliata Ald. |
| Fore coxæ yellow | 6 |
| 6 Bristles of the thorax mostly pale, hairs of abdomen pale..... | townsendii Ald. |
| Bristles of the thorax and hairs on the base of the abdomen
above black | borealis Ald. |

Mesorhaga varipes sp. nov.

♂. Length 4 mm. Face and front green, the former broad with thick coarse white pollen which almost conceals the ground color in some lights; antennæ black, bristles of second joint yellowish; ocellar bristles black with a bunch of small pale hairs back of them; a few long yellowish bristly hairs on each side at the upper corners of the eyes; a few of the orbital cilia at the upper corner of the eye long and blackish, lower orbital cilia white.

Thorax blue-green; pleurae with white pollen; bristles on the anterior portion of the dorsum blackish, those on the posterior part and the four on the margin of the scutellum yellowish.

Abdomen blue-green, its incisures very narrowly yellow; hairs on the dorsum of the abdomen short and yellow, those on the venter long and white; hypopygium and its appendages shining black, the latter long and fringed with short pale hairs.

Coxæ black or green with white pollen; fore pair with long white hairs on the front surface; tips of coxæ and the trochanters yellow; fore femora wholly yellow; middle femora with a black streak below from the base to about the middle; hind femora black with yellow tips; all femora with long white hairs below; tibiæ yellow, the tips of the hind pair a little brownish; tarsi infuscated from the tip of the first

joint; fore metatarsi three-fourths as long as their tibiæ and longer than the remaining four joints together; middle metatarsi about four-fifths as long as their tibiæ and one and one-fourth times as long as the remaining four joints.

Knob of the halteres yellow, stem brown; tegulæ white with black tips and long white cilia. Wings nearly hyaline; costa rather thick and black from the tip of the first vein; veins yellowish at the root of the wing.

Described from two males taken at Eastham, Massachusetts, June 27th, by C. W. Johnson. Type in the collection of the Boston Society of Natural History.

Mesorhaga nigripes Ald.

Two females and four males that seem to belong to this species are in the Cornell University material sent me for study. They come from Blue Lake, Humboldt County, California, and were taken by J. C. Bradley.

Prof. Aldrich described this species from females. I give the characters of the male below. The females differ from his description only in having all the tibiae and tarsi uniformly brown, and there is a small black bristle at the upper corner of the eye not mentioned by him.

♂. Hypopygium rather long, shining black, with a few long hairs on the outer or dorsal surface; appendages becoming more yellowish towards the apex, rather thick and tipped with two stout, black bristles. Femora ciliate below with long white hairs, these hairs as long as the thickness of the femora; in the female these hairs are much shorter, less than one-half the thickness of the femora. Third antennal joint rounded at tip, about as long as wide, second joint with a very long stout bristle below; in the female the antennae are formed about as in the male and of nearly the same size, but the bristles of the second joint are much smaller. The fore and middle metatarsi of both sexes are nearly as long as the four remaining joints.

Table of Males of the North American Species of Campsicnemus.

1	Middle tibiæ not or but little incrassated.....	2
	Middle tibiæ incrassated at least at base.....	4
2	Middle tibiæ yellow, not flattened.....	degener Wh.
	Middle tibiæ mostly or wholly black and somewhat flattened....	3
3	Femora mostly yellow	arcuatus sp. nov.
	Femora mostly black	nigripes sp. nov.

- 4 Middle tibiæ thickened only near the base.....*hirtipes* Loew.
 Middle tibiæ incrassated throughout..... 5
 5 Middle tibiæ with a pedunculated knob near their apices.....
 philoctetes Wh.
 Middle tibiæ without a knob..... 6
 6 Middle tibiæ entirely black*oedipus* Wh.
 Middle tibiæ in large part yellow..... 7
 7 Middle metatarsi bent semicircularly.....*thersites* Wh.
 Middle metatarsi not strongly curved.....*claudicans* Loew.

Campsicnemus arcuatus sp. nov. (Fig. 1).

♂. Length 2 mm., of wing 2.5 mm. Face narrow above, wider below, covered with dark yellowish brown pollen; front shining black; antennæ black, third joint larger than wide, rounded at tip.

Thorax shining black on the dorsum with purple reflections and an obscure green vitta visible on the posterior part. Scutellum bluish black with a reddish border; it has one pair of large bristles and between these are six hairs on the margin. Abdomen dull black; hyopygium concealed.

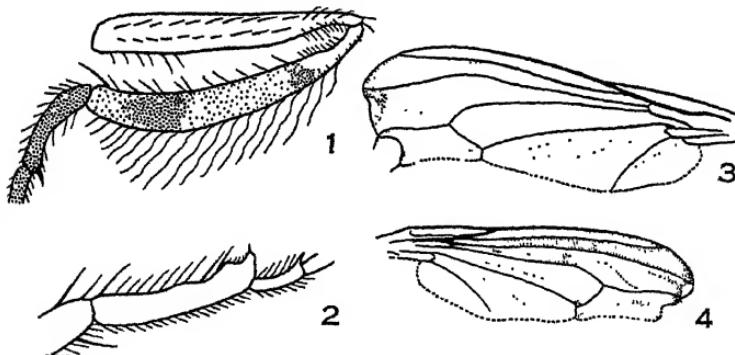


Fig. 1.—Tibia and metatarsus of middle leg of *Campsicnemus arcuatus* sp. nov.

Fig. 2.—First and second joints of middle tarsus of *C. nigripes* sp. nov.

Fig. 3.—Wing of *Liancalus hydrophilus* Ald.

Fig. 4.—Wing of *L. limbatus* sp. nov.

Fore coxæ yellow with silvery pollen and minute black hairs on the front surface; middle and hind coxæ black; all femora yellow, the fore pair a little blackened at base; middle pair narrowed near the apex; fore and hind tibiæ blackened at tip for one-third their length, also somewhat darkened at base, more yellowish in middle; middle tibiæ narrowed and briefly yellow at base, the remainder dull black, somewhat flattened, strongly and evenly arcuate, fringed with long delicate hairs above, these hairs curled at their tips; middle metatarsi curved upwards and with a stout sharp spur at tip (Fig. 1).

Tegulae brownish with black cilia; knob of halteres yellow. Wings dark grayish with black veins.

Described from one male taken at Victor, Colorado, June 11th, at an elevation at 9800 feet. Type in the author's collection.

Campsicnemus nigripes sp. nov. (Fig. 2).

♂. Length 2 mm., of wing 2.5 mm. Face narrow with nearly parallel sides, covered with yellowish brown pollen which is darkened on the upper portion of the face; front black; antennae black, third joint longer than wide, rounded at tip.

Thorax shining black with a trace of a green vitta on the posterior part; scutellum bluish black with a few delicate hairs on the margin (if there have been bristles on the margin, as no doubt there have been, they have been broken off). Abdomen black with green reflections.

Coxæ and legs altogether black, except the tips of the middle femora which are yellowish; the four hinder femora ciliated with short stout hairs below; middle tibiæ long, flattened, with a few rather long bristles above; middle metatarsi (Fig. 2) slightly arched with a large subquadrate ending which has a spur-like projection at one corner; the second joint is attached at the base of this quadrate ending; on the concave side the metatarsi are fringed with little bristles or hairs which are about as long as the thickness of the joint and two longer bristles near the base.

Tegulae and their cilia brown; halteres dark yellowish brown. Wings dark grayish; veins black.

Described from one male taken at Sacramento, California, June 4th. Type in the author's collection.

Table of Males of the North American species of Liancalus.

- | | | |
|---|--|-------------------|
| 1 | First joint of fore tarsi shortened..... | 2 |
| | Second joint of fore tarsi shortened..... | 3 |
| 2 | Last three joints of fore tarsi of nearly equal length.. | similis Ald. |
| | Third joint of fore tarsi as long as fourth and fifth together. | querulus O. S. |
| 3 | The opaque white spot at the tip of the wing circular. | |
| | | genualis Loew. |
| | The opaque white spot at apex of wing oval or semicircular..... | 4 |
| 4 | Wing deeply excised back of fourth vein and with two bristle-like pencils of hairs one either side of the excision
(Fig. 3) | hydrophilus Ald. |
| | Wings deeply excised back of fourth vein but without the pencils
of hairs, (Fig. 4) | limbatus sp. nov. |

Liancalus hydrophilus Ald. (Fig. 3).

I took a single male of this species at Colorado Springs. It was resting on rocks over which water was trickling, in South Cheyenne Canon. It measures but 7 mm. in length, which is about 2 mm. less than Prof. Aldrich's type specimens from the Black Hills, South Dakota, but the length of the wing is 7 mm., while the wings of his measured 7.5 mm. The knees of this specimen are distinctly but narrowly yellow. The other characters are as he gives them (*Psyche*, Vol. 6, p. 569). The drawing of the wing is from my specimen (Fig. 3).

Liancalus limbatus sp. nov. (Fig. 4).

♂. Length 9 mm., of wing 7.5 mm. Face bright green with silvery pollen which is quite thick along the orbits; divided a little below the middle by a transverse ridge; palpi thickly covered with silvery pollen and with small black hairs; proboscis dark brown; antennæ black, third joint only a little longer than wide, somewhat triangular; front dark greenish gray with a little white pollen; ocelli placed on a small brown spot; the black orbital cilia extending down to about the middle of the eye; below these are a few fine white cilia which are difficult to distinguish from the long yellowish hairs which cover the lower half of the occiput; the two post-vertical bristles are prominent but not very large.

Thorax bright metallic green with four golden-green vittæ, the outer ones broken at the suture; thorax quite thickly covered with white pollen which is almost invisible in certain lights; a single row of acrostichal bristles; six dorsocentrals on each side; bristles of the thorax inserted in minute black dots; metanotum green with white pollen; scutellum with six marginal bristles.

Abdomen green but so thickly covered with pollen as to appear whitish in certain lights; base of second and hind margin of second to fifth segments brown, which color extends forward along the center of the dorsum and reaches the base on the second and fourth segments; this brown color is due to pollen and the shining green ground color shows through it in certain lights; sixth segment green; abdomen with minute black hairs and more abundant and longer fine yellowish hairs, those on the sides and on the first segment longest; first segment with a few slender black bristles near the hind margin above; hypopygium mostly brown with two flattened filaments which are sparsely fringed with pale hairs and are two-thirds as long as the abdomen.

Fore coxæ green with white pollen and fine white hairs on the front surface and two small black bristles near the tip; middle and hind coxæ more blackish; legs green; knees slightly yellowish; tarsi black; fore tarsi with the first joint long, second joint only a little longer than wide, slightly dilated and fringed below with short bristles as in *genualis* and *hydrophilus*, third joint longer than fourth.

Tegulae white with sharply defined yellow border and yellowish cilia; halteres yellow. Wings hyaline with brown clouds, one bordering the costa faint from the tip of the first vein to the tip of second vein more distinct from there to the apex of the wing, one along the second and third veins filling the cell between them except in outer part, one on last section of fifth vein; also a brown streak between third and fourth veins which has the appearance of a spurious vein; this streak is bent and has a cloud extending forward at about its first third; tip of wing dark brown with a somewhat semicircular opaque white spot at apex, this spot extending nearly from the tip of the third vein to the tip of the fourth vein; third vein ending in the apex of the wing; fourth vein a little angulated at the cross vein; there is a very small square cell at the inner angle of fifth vein and cross-vein; this cell is not quite complete in the right wing from which the drawing was made but is perfect in the left wing; cell between first vein and costa yellowish.

♀. Face and front with yellowish brown pollen; vittæ of thorax more coppery; a few stout black bristles near the hind margin of the third abdominal segment towards the sides; feet simple; wings simple with a large brown cloud on fourth vein before the cross-vein on last section of fifth vein and along the costa from tip of second vein to apex of wing.

Described from one male and one female taken at Berkeley, California, May 8th, on a wall of rock in a little canyon; the rock was covered with water-soaked moss. Type in the author's collection.

This species is very much like the European species *virens* Scop., but I think it is distinct. I have not seen *virens*, but Dr. Lundbeck has a drawing of the wing of that species, which does not show the deep emargination back of the fourth vein, nor does he mention it in his description, and he does not show any cloud on last section of fifth vein. The little cell at the inner angle of the fifth vein and the cross-vein in the male of *L. limbatus* do not appear in his figure. This cell may not be a constant character, but only accidental.

Photographs Received for the Album of the American Entomological Society.

During the year 1916 photographs for the Album were received and acknowledged from the following, and the members of the Society wish again to thank the donors for their gifts, which are much appreciated:

Mrs. Annie Trumbull Slosson, J. R. Malloch, F. Haimbach, M. S. Royal, of India, and Louis Laplace.

Notes on some Buprestidae of Northern California (Col.).

By W. J. CHAMBERLIN, Forest Entomologist, Oregon State College, Corvallis, Oregon.

This paper is the result of observations and collections made during two summers spent in northern California. The summer of 1915 was spent at Weed, a small lumbering town in Siskiyou County, at the base of Mt. Shasta. The general elevation surrounding Weed is 4500 feet. The summer of 1916 was spent in Siskiyou, Del Norte, Humboldt and Mendocino Counties of California.

Regarding the species taken at Weed it might be well to mention that there are from 50 to 60 cars of logs brought in daily from the Trinity Mountains, some thirty miles distant. It is probable that the majority of the forest insects are brought in with this timber, though undoubtedly some are attracted from the surrounding territory by the odor of fresh pine.

Buprestids were by far the most numerous beetles occurring in the vicinity of Weed and over 450 specimens were taken at odd times during a six weeks' stay.

1. *Chalcophora angulicollis* Lec.

Twenty-six specimens of this species were taken at Weed in 1915. The majority were captured resting in the bright sunshine, on buildings, telephone poles, on the wooden sidewalks and a few were taken while in flight. No less than ten specimens were taken on piled lumber. They attract attention by the rasping sound made in flight and are easily captured in the hand. They seem to be attracted by moving objects and will often alight on horses, moving wagons, or on man.

This species is common all over the northern half of the State, breeding in yellow pine, Douglas fir, white and grand fir.

2. *Dicerca prolongata* Lec.

This species has been taken by Dr. Van Dyke on *Populus trichocarpa* in Trinity County, California, and on *Populus tremuloides* at Lake Tahoe. It breeds in *P. trichocarpa* and doubtless in *P. tremuloides* also.

3. Dicerca sexulis Cr.

This is one of the handsomest species of the genus and is found throughout the northern part of the State. I have taken it from Douglas fir, which seems to be its principal host plant; also from yellow pine. Dr. Van Dyke has taken it from knobcone pine at McCloud, in June, 1914. I have taken specimens emerging from Douglas fir on April 4, at an elevation of 3500 feet in the Santiam National Forest of Oregon.

4. Dicerca tenebrosa Kirby.

Of this species Dr. Van Dyke writes as follows:

Have found the western phase of this species about Fallen Leaf Lake, Lake Tahoe, in July, 1915, on dead lodge pole pine, in which it no doubt breeds. It probably extends south through the Cascade-Sierra range in the lodge pole pine belt.

I have never encountered this species in California, but in the Blue Mountains of eastern Oregon it is the most common member of the genus and breeds in both *Pinus ponderosa* and *P. contorta*. Near Klamath Falls, Oregon, it was taken from *Abies concolor*.

5. Dicerca hornii Cr.

This species breeds in *Alnus* and *Ceanothus* in most counties of northern California. It is quite common locally at certain periods.

6. Dicerca pectorosa Lec.

This rare species was taken by Dr. Van Dyke at Lake Tahoe in July, 1915. In Oregon it breeds in peach, and I have taken it on the lodge pole pine in Grant County, Oregon.

7. Trachykele opulenta Fall.

I quote from Dr. Van Dyke on the two species of this genus:

A number of brilliantly green specimens of *Trachykele* were beaten from the alpine juniper on the ridge above Lake Tahoe, during July, 1915, by Ralph Hopping, E. P. Van Duzee and myself. Many borings in dead juniper limbs were also observed which were no doubt due to this species. This species, I have generally been considering as Fall's *opulenta*, though it may be true *blondeli* Mars. about which there has been so much uncertainty. It is quite similar to other specimens which I have from Seattle, Washington, where it no doubt lives on *Thuja plicata*, from Shasta County, California, in the territory of Sargent cypress in Marin County. In the southern Sierras, this species is also

found but another green one is also found there. This last is probably the true *opulenta* Fall.

The author has taken one specimen from the sapwood of *Lebocedras decurrentis*.

8. *Trachykele nebulosa* Fall.

"One specimen taken at Carrville, Trinity County, California, in July, 1913. Others were taken about Lake Tahoe from *Abies concolor* by Hopping, Van Duzee and myself. It breeds in *Abies concolor* and *A. magnifica* as specimens have been taken emerging." Both species of this genus undoubtedly occur in favorable localities throughout the northern part of the State. They have been taken at Corvallis, Oregon, and also in Western Washington.

9. *Poecilonata cyanipes* var. *ferrea* Mels.

This species is found throughout the northern part of the State and probably breeds in all the poplars and willows. I have dug adults from *P. tremuloides* and *P. trichocarpa* in Humboldt County.

10. *Buprestis gibbsii* Lec.

Not common; found occasionally on oak and poplar in which they probably breed. One specimen taken at Garberville, Humboldt County, California, August, 1916. Found in Sonoma County, by Rivers; at Nevada City and Lake Ellann, Tuolumne County, by Van Dyke. May breed in *Quercus*.

11. *Buprestis connexa* Horn.

This rare and beautiful species is never found in numbers in any locality. Three specimens were captured. The first specimen was taken July 18 from the sapwood of yellow pine (*P. ponderosa*), fully mature and would doubtless have emerged in a few days. The gallery traversed the cambium for some distance, winding around in a very irregular pattern, then entered the sapwood to a depth of two inches. The pupal cell was just within the sapwood. The second specimen was taken on the 28th of July, resting on the foliage of yellow pine with numbers of *B. rusticorum*. The last specimen was found embedded in pitch on the end of a yellow pine log.

12. *Buprestis laeviventris* Lec.

This was the most numerous species encountered. Out of 116 specimens taken only 8 were taken on the freshly cut logs. They seem to have a preference for old dry logs and poles without bark. Many were taken on railroad ties and in the dust along the road. This is the only species I have ever encountered which deposits its eggs in or on logs where there is no bark. I observed one individual deposit eggs in the weather checks in the end of an old dry log. How the young larvae were to enter a seasoned pine log and live is a mystery. On another occasion a female deposited her eggs in a small check on the side of a pine log. The place selected was destitute of bark, though less than six inches away the bark was still on the log.

The specimens taken show a great variety of patterns on the elytra, varying from a few faint spots of yellow on the black background to great splotches, which cover over one-half the surface. The basic color varies from a shiny black to an iridescent green. The length ranges from 15 mm. to 23.5 mm.

13. *Buprestis rusticorum* Kirby.

This species was found rather abundantly in certain situations. Out of 79 specimens collected, 63 were taken feeding on the needles of *Pinus ponderosa*. Many were observed copulating during August and were easily captured by holding a cyanide bottle or other receptacle under them and jarring the limb or twig. When thus disturbed they fold their appendages and drop to the ground. It is not easy to detect them here as they immediately crawl into the grass, under twigs, rocks, or into any convenient hiding place. Another favorite resting place is the sawdust fills. Many were observed crawling around through the coarse sawdust and debris. Breeds in yellow pine and Douglas fir, and occurs in all the northern counties.

14. *Buprestis langii* Mann.

This is undoubtedly the female of *Buprestis fasciata*. A single specimen was taken in flight, July 7, 1915. Dr. Van

Dyke has authentic records of this species being dug from its pupal cells in Douglas fir. It is very probable that it also breeds in yellow pine. They are often seen on the bright green leaves of the poplars and willows, seeking these resting places because of the protection they afford.

15. *Buprestis lauta* Lec. (*B. arulenta* Linn.)

Probably one of the most common species from Canada to Southern California. This species breeds in Douglas fir, yellow, lodge pole, sugar and Monterey pine, and western red cedar. The last named host is an Oregon record, the author having dug an adult male from a fallen *Thuja plicata* log on the Coast Mountains in April, 1914.

16. *Buprestis confluens* Say.

This is ordinarily a Great Basin species, but Dr. Van Dyke states that it has been taken in the vicinity of Lake Tahoe, California, on one or two occasions. Breeds in poplar.

17. *Buprestis adjecta*.

One taken on an electric light pole July 20, 1915, at Weed. Occurs from Washington to Tulare County, California. Probably breeds in yellow, Jeffrey and lodge pole pine.

18. *Melanophila consputa* Lec.

This species was very numerous and caused considerable annoyance to the men employed about the mill pond by alighting on the neck, hands and arms and biting. Most of the 78 specimens gathered were taken resting on the logs floating in the mill pond, though some were secured from the stacks of cord wood. A most variable species; in markings it varies from solid black to dull bronze and may have from two to fourteen bright or dull yellow spots on the elytra. In size it ranges from 4.5 mm. to 14.75 mm. in length, and from 2 mm. to 5.4 mm. in width. The females are larger than the males, as in most species of this family. Breeds in yellow pine.

19. *Melanophila longipes* Say (*acuminata* De G.)

Twenty-four specimens of this species were taken about the log pond. They were even more of a nuisance than *M. consputa*. Their bite is not just what one would call agree-

able and they cause considerable profanity to float out on the otherwise pure air. Breeds in yellow pine, Douglas fir and the true firs (*Abies*).

20. *Melanophila atropurpurea* Say.*

I have assigned thirteen specimens, taken at Weed, to this species. I must confess, however, that the difference existing between *M. longipes*, *M. acuminata* and *M. atropurpurea* is almost *nil* in my judgment. The separation I have made is based on the shape of the prothorax and the difference here grades from one extreme to the other until it is a mere guess where one species stops and another begins. Statements under *M. longipes* apply to the species also.

21. *Melanophila drummondi*.

Less common in California than in Oregon. Breeds freely in Douglas fir, grand fir (*Abies grandis*) and to some extent in yellow pine.

22. *Melanophila gentilis* Lec.

This beautiful species was not uncommon, but was rather more active than any of the others and a capture of two specimens out of every five was a good record. Thirty-six specimens were taken; fully one-half of these were taken from the bark or debris on the cars after the logs were unloaded. This species, like *Chalcophora angulicollis*, will rest immovable for hours where they are exposed to the direct rays of the boiling sunshine. In cloudy weather neither species is seen. I find my specimens collected in California are slightly larger and less bright in color than specimens collected by Professor Wickham in Arizona. Breeds in yellow pine. Ralph Hopping states that it also breeds in *P. lambertiana*.

23. *Melanophila* sp.

A peculiar *Melanophila*, which Dr. Van Dyke believes is a western form of *M. pini-edulis* Burke, was taken by him at Carrville, Trinity County, California, in July, 1913, and at McCloud, Siskiyou County, in July, 1914, on yellow pine.

*It is possible that the true *atropurpurea* was not taken and the specimens here mentioned are mere phases of *M. longipes*.

24. Anthaxia aeneogaster Lap.

Three specimens of this tiny Buprestid were secured. A pair in copulation was taken on the flowers of the pearly everlasting (*Antennaria sp.?*) and a single female on the dandelion (*Taraxacum officinale* Web.). Dr. Van Dyke has reared specimens from redwood and knobcone pine, and I have reared it from lodge pole pine. It undoubtedly breeds in yellow pine, and has been reported from certain broad leaf trees.

25. Anthaxia deleta Lec.

Dr. Van Dyke finds this species common about willows at times. Across the line in Oregon it is taken commonly on blossoms in the yellow pine belt.

26. Anthaxia sublaevis Van Dyke. One specimen taken in Siskiyou County, and others in Tuolumne County, California.**27. Chrysobothris femorata Fab.** Found throughout the State on oak.**28. Chrysobothris contigua Lec.**

This little *Chrysobothris* was not at all common; five specimens were taken on yellow pine slabwood. They are decidedly more active than most of the other members of this genus. Breeds in smaller limbs of yellow pine.

29. Chrysobothris dentipes Germ.

Doctor Horn in his monograph mentions the fact that he has never seen this species from California. I believe it is common in the northern half of the State. Its large size attracts attention at once. Though only 8 specimens were captured at Weed, many more were seen, but unfortunately they were observed at times when it was impossible to capture them. Breeds in *P. ponderosa*.

30. Chrysobothris californica Lec.

Dr. Van Dyke gives me the following information concerning this species:

One specimen, Castella, California, (in Blaisdell collection) and two from Nevada County, California (Van Dyke collection); nothing is known of the biology of this rare species.

31. Chrysobothris caurina Horn.

This was by far the most common species of the genus found

during the summer. Forty-six specimens were taken. They are very uniform in color and sculpture. Most of the specimens were taken on logs floating in the mill pond. Dr. Van Dyke says of this species: "Probably the most common yellow pine Chrysobothris we have in northern California and eastern Oregon. Farther south in California it becomes scarcer, its place being taken by *C. monticolae* Fall. Undoubtedly breeds in yellow pine."

32. *Chrysobothris monticolae* Fall.

The species has a more delicate color than most of our other western species. It tends towards a lilac, sometimes hinting at a rose tint and in nature has more or less of a white powdery coating which, however, is easily removed by careless handling. Two specimens, July and August. Breeds in lodge pole pine.

Weed is about 200 miles northwest of Lake Tahoe, which is the most northern point hitherto recorded for this species.

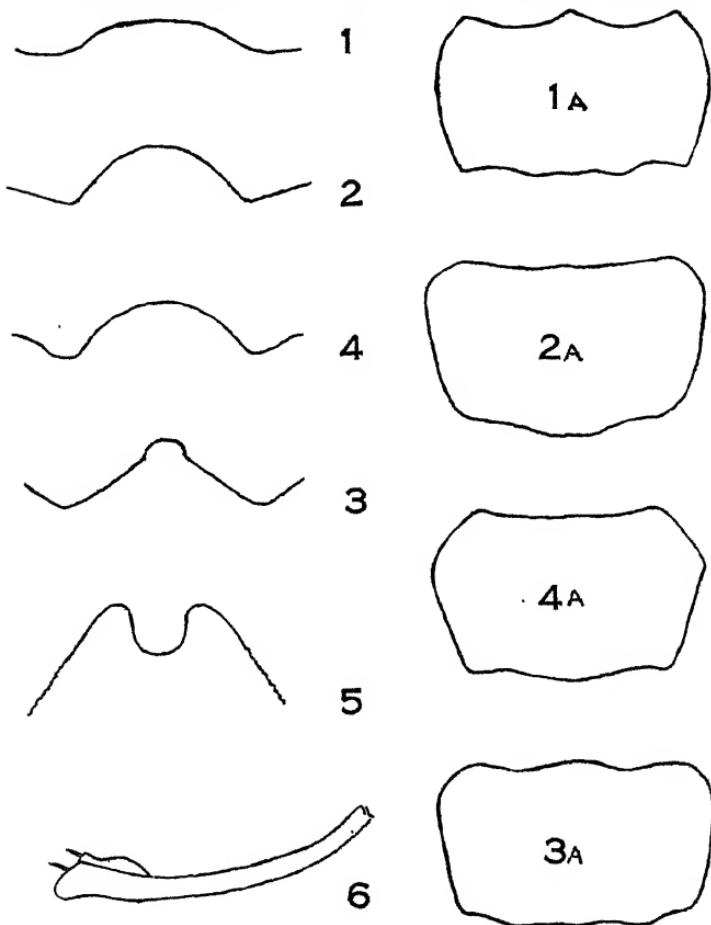
33. *Chrysobothris dolata* Horn.

Two females were taken at Weed in July. Four specimens of this species were taken in Grant County, Oregon, in July, 1914; three are females and the fourth a male. A close study of the six specimens at my disposal shows a wide variation and may possibly include more than one species. The five females exhibit four different forms, which will be more readily understood from the figures than from a printed description. Figure 1 is the clypeus of var A., Fig. 1a is the thorax of the same specimen; 2 and 2a are clypeus and thorax of var B., etc. Aside from the variation in clypeus and thorax there is little difference in the specimens. The antennae of 1 and 4 are dark cupreous, while 2 and 3 are green; 1 shows no callosites on the front; 1 and 3 are not as densely pubescent as 2 and 4. All show the same sculpture and all are of an iridescent violet color beneath. The prosternum of number 4 is a little more coarsely and deeply punctured than the others. Numbers 2 and 4 are from eastern Oregon, while numbers 1 and 3 are from Weed, California.

As far as I am aware there has never been published a

description of the male of *C. dolata*, which I believe is almost unknown. The following description is made from a single male collected by the author in the Blue Mountains of eastern Oregon, July, 1914:

♂. Has the general appearance of the female as described by Horn. Thorax a little more angulated. Color beneath iridescent, reddish purple, antennae dark purple, basal joints slightly greenish, much heavier and with less taper than the female and the last four joints have a squarish appearance, third joint about as long as next two, not



Chrysobothris dolata Horn.—Figs. 1 to 4.—Clypei of females. Figs. 1a to 4a.—Thoraces of females. Fig. 5.—Last ventral segment of male. Fig. 6.—Anterior tibia of male.

longer. Front as described by Horn, slightly pubescent, clypeus with a triangular oval emargination at middle, arcuate on each side. (This is exactly as Horn describes the female). I find that the clypeus of the females varies considerably in all specimens I have seen but is usually as shown in Figures 1 and 2. Thorax more angulated than one would surmise from Horn's description, though fitting his figure admirably; two depressions each side of middle and a third one near the margin, center (I fail to find the crescentic or oblique depressions of Dr. Horn) coarsely punctured, the punctures running together transversely, giving a strigilated appearance. Elytra same as female, prosternum not lobed, coarsely and closely punctate, margin of last ventral (Fig. 5) serrate; tip deeply, semi-circularly emarginate, the emargination deeper than wide. Anterior tibia dilated at end as shown in Fig. 6. Length 13 mm.

A single male taken in Grant County, Oregon, July 21, 1914, on lodge pole pine (*P. contorta*). This species probably breeds in *P. contorta*, *P. lambertiana* and *P. ponderosa*.

34. *Chrysobothris pseudotsugae* Van Dyke.

One specimen taken in August. This species bears a close resemblance to *C. caurina*, but is smaller and darker. The prosternum being lobed will at once separate it from *caurina*. Taken on *Abies grandis*, grand fir, at Weed, August 11, 1915. Hopping has taken this species from *P. ponderosa*.

35. *Chrysobothris laricis* Van Dyke.

This species described from a series collected by the author in eastern Oregon on larch and lodge pole pine, and has been taken in the lodge pole pine belt above Lake Tahoe and in Tuolumne Meadows, California. It no doubt will be found in the higher Cascade and Sierra Ranges from Oregon to Central California.

36. *Chrysobothris nixa* Horn.

This species is fairly common in northern California and ranges over into the southwestern portion of Oregon. Breeds so far as known only in incense cedar (*Libocedrus decurrens*).

37. *Chrysobothris viridicyanea* Horn.

This beautiful green species breeds in the limbs and smaller branches of *Libocedrus decurrens* and is found in most of the northern counties of the State. The following counties are represented in Dr. Van Dyke's collection: Trinity, Siskiyou and Placer. I have two specimens from Siskiyou County.

38. *Chrysobothris sylvana* Fall.

The type material was collected from apple in northern Sonoma County, California. Mr. Nunenmacher, of Oakland, has taken it in Del Norte County. I have collected it in the Cascades of southern and central Oregon. A number of specimens were dug from the sapwood of Douglas fir, March, 1916.

39. *Chrysobothris mali* Horn.

Occurs throughout California, where it breeds in cherry, willow and oak. In Oregon the writer has bred it from prune, peach and apple.

40. *Chrysobothris pubescens* Fall.

I have a single specimen of this species taken in southern Oregon. Dr. Van Dyke states that in California it is generally confined to the Sierras. He has taken it at Lake Tahoe and in Shasta County. There are specimens in his collection from Reno, Nevada and from Tulare County, California. It probably breeds in the smaller limbs of Jeffrey and yellow pine.

41. *Chrysobothris deleta* Horn.

This is not a typically northern species, but does occur at rare intervals, as shown by a specimen from Lake Tahoe and one from Castelia, Shasta County, July 8, 1912 (in the Van Dyke collection).

42. *Chrysobothris cyanella* Horn.

This species although rare is rather widely distributed throughout the Cascade-Sierra region. The writer has taken specimens in the vicinity of Ashland, Oregon (just over the California line). It undoubtedly breeds in the twigs of yellow pine. In the Van Dyke collection there are specimens taken in Shasta County, Siskiyou County, and Lake Tahoe, California.

43. *Chrysobothris prasina* Horn.

The type of this species is supposed to have been collected in northern California. Dr. Van Dyke has one specimen taken in Sonoma County, June 30, 1912.

(To be continued.)

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., MARCH, 1917.

Specialization in Entomology.

Are there any readers of the News who still read *The Poet at the Breakfast Table* and recall this piece of conversation, which *The Entomologists' Monthly Magazine* (London) printed as a motto on the title page of its fifteenth volume for 1878-79?

I suppose you are an entomologist?

Not quite so ambitious as that, sir. I should like to put my eyes on the individual entitled to that name. No man can be truly called an entomologist, sir; the subject is too vast for any single human intelligence to grasp.

There were entomologists, just as there were giants, in former days. Linnaeus was more than an entomologist. Fabricius, Latreille, Leach, Westwood and Burmeister were entomologists. In later years, however, we have specialized still more narrowly, except when we are entomologists by compulsion. Not only do we have lepidopterists, but also microlepidopterists, nay, erycinidists and even catocalists. We are not sure whether there are not those who limit themselves to the study of a single *species*, which is certainly the case among those devoted to mammals.

It is interesting to see how the journals have tried to keep pace with specialization. *Papilio*, the organ of the New York Entomological Club, fluttered for four volumes from 1881 to 1884. The late F. W. Konow sustained the *Zeitschrift für systematische Hymenopterologie und Dipteroologie* from January 1, 1901, to May, 1908, but it did not long survive its editor. *Entomologische Blätter, Zeitschrift für Biologie und Systematik der Käfer* (Berlin), has appeared from 1905 down to

at least December, 1915. In general it seems that the number of specialists in any one or two orders of insects is not sufficient to support a special journal, and we know of none such provided with an endowment fund guaranteeing its permanency. In this matter we must still be entomologists, apparently, and yet the record of general entomological journals contains many a short-lived periodical. We have only to recall *The American Entomologist* of three volumes, 1868-1880, and *Entomologica Americana*, of six volumes, 1885-1890.

Questions and Answers.

The News invites those having any entomological questions which they wish answered to send such in for publication under this heading, and also invites answers from its readers or others to these questions. Questions and replies should be as brief as possible and the Editors reserve the right not to publish any of either class which seem to them objectionable or inappropriate. Those sending in contributions to this department will please indicate whether they wish their names or merely one or more initials to appear in connection with their communications, but all such must be accompanied by the full name and address of the writer for the information of the editors.

QUESTION No. 5.—Are there any recorded aberrations of *Melitaea brucei* or *Phyciodes camillus* which have received names? We are so far removed from entomological libraries that it is impossible to obtain this information here.—DR. JOHN A. COMSTOCK, 1275 Bellevue Avenue, Los Angeles, California.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new species are all grouped at the end of each Order of which they treat. Unless mentioned in the title, the number of the new species occurring north of Mexico is given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

4—The Canadian Entomologist. 5—*Psyche*. 6—Journal, New York Entomological Society. 8—The Entomologist's Monthly Magazine, London. 10—*Nature*, London. 11—Annals and Maga-

zine of Natural History, London. 34—Proceedings, Iowa Academy of Sciences, Des Moines. 50—Proceedings, U. S. National Museum. 68—Science, New York. 69—Bolletino, Societa Italiana Entomologica. 128—Proceedings, Linnean Society of New South Wales, Sydney. 153—Bulletin of the American Museum of Natural History, New York. 180—Annals of the Entomological Society of America. 334—Proceedings of the American Academy of Arts and Sciences, Boston. 406—Boletin del Museo Nacional de Chile, Santiago de Chile. 407—Journal of Genetics, Cambridge, England. 420—Insecutor Inscitiae Menstruus: A monthly journal of entomology, Washington. 449—British Museum (Natural History) Publications, London. 486—Journal, Elisha Mitchell Scientific Society, Chapel Hill, N. C. 538—Lorquinia, Los Angeles. 540—The Lepidopterist. Official Bulletin, Boston Entomological Club. 543—Genetics, Princeton, N. J. 544—Miscellanea Entomologica. 545—Proceedings, Entomological Society of British Columbia, Vancouver.

GENERAL SUBJECT. Crampton, G. C.—The orders and relationships of Apterygotan insects, 6, xxiv, 267-301. Dyar, H. G.—A psychological locality, 420, iv, 131-2. Joutel, L. H.—Biographical notice by W. T. Davis, 6, xxiv, 239-43. Kenoyer, L. A.—Insect pollination of timberline flowers of Colorado; Insect pollination of *Frasera stenosepala*, 34, xxiii, 483-86; 487-8.

PHYSIOLOGY AND EMBRYOLOGY. Hyde, R. R.—Two new members of a sex-linked multiple (sextuple) allelomorph system (*Drosophila*), 543, i, 535-80. Hyde & Powell.—Mosaics in *Drosophila ampelophila*, 543, i, 581-83. Metz, C. W.—Mutations in three species of *Drosophila*, 543, i, 591-607. Safir, S. R.—Buff, a new allelomorph of white eye color in *Drosophila*, 543, i, 584-90.

MEDICAL. Cummings, B. F.—The louse and its relation to disease; its life-history and habits; how to deal with it, 449, Econ. Ser., No. 2.

ARACHNIDA, ETC. Emerton, J. H.—Recent studies of Canadian spiders, 4, 1917, 13-16. Newman, H. H.—A case of synchronic behavior in Phalangiidae, 68, xlvi, 44.

Ewing, H. E.—New Acarina. Part II.—Descriptions of n. sps. and var. from Iowa, Missouri, Illinois, Indiana and Ohio, 153, xxxvii, 149-172. Hirst, S.—On some new mites of the suborder Prostigmata living on lizards [1 n. gen.], 11, xix, 136-143. McGregor, E. A.—Descriptions of seven n. sps. of red spiders [4 new], 50, ii, 581-90.

NEUROPTERA, ETC. Rich, S. G.—Some respiratory structures of dragon-fly larvae, 6, xxiv, 306-7. Tillyard, R. J.—Further observations on the emergence of dragon-fly larvae from the egg, 128, xli, 388-416.

ORTHOPTERA. Giglio-Tos, E.—Mantidi esotici, 69, xlvi, 1-44.

Morse, A. P.—A New England orthopteran adventive, 5, 1916, 178-80.

HEMIPTERA. Brown, K. B.—The specific effects of certain leaf-feeding Coccidae and Aphididae upon the pines, 180, ix, 414-24. Dickerson & Weiss.—The ash leaf bug, *Neoborus amoenus*, 6, xxiv, 302-6. Stoner, D.—Distributional notes on some Iowa Pentatomoida, 34, xxiii, 303-7. de la Torre Bueno, J. R.—Aquatic hemiptera. A study in the relation of structure to environment, 180, ix, 353-65.

Baker, A. C.—Synopsis of the genus *Saltusaphis* [3 new], 4, 1917, 1-9. McAtee, W. L.—Key to the nearctic species of *Paracalocoris* (Miridae) [25 new], 180, ix, 366-390. Parshley, H. M.—On some Tingidae from New England [3 new], 5, 1916, 163-8. Quaintance & Baker.—A contribution to our knowledge of the white flies of the subfamily Aleyrodinae (Aleyrodidae), 50, ii, 335-445. Wilson, H. F.—Aphid notes from British Columbia [1 n. sp.], 545, No. 5, 82-5 (1915).

LEPIDOPTERA. Cockle, J. W.—Notes on the habits of some L., 545, No. 5, 91-4 (1915). Day, G. O.—Notes on the early stages of *Calocampa cineritia*; Notes on the early stages of *Epirrita dilutata*, 545, No. 5, 86-7; 95-6 (1915). Figueroa, C. S.—Los cosidos de Chile, 406, viii, 49-55. Forbes, W. T. M.—On the Tympanum of certain L., 5, 1916, 183-92. Harrison, J. W. H.—A further probable case of sex-limited transmission in L., 10, xcix, 248. Studies in hybrid *Bistoninae*, 407, vi, 94-161. Thierry-Mieg, P.—Descriptions de lepidopteres nouveaux, 544, xxiii, No. 10-11. Wolden, B. O.—The white admiral or banded purple butterfly in Iowa, 34, xxiii, 269.

Reiff, W.—*Catocala amica* subsp. *novangliae*; Additions to the paper on *Catocala amica*; *Colias philodice* f. *nigro-fasciata*, 540, i, 12-15; 21; 22-23. Swett, L. W.—Geometrid notes: New species from California [1 new], 540, i, 10-11.

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1916, 159-63. Knab, F.—Further notes on Syrphidae, 420, iv, 133-5. MacGregor, M. E.—*Calliphora vomitoria* captured by an oyster, 8, 1917, 18-19. Metcalf, C. L.—A list of Syrphidae of North Carolina, 486, xxxii, 95-112. Parker, R. R.—Notes concerning *Gastrophilus haemorrhoidalis*, 6, xxiv, 253-5. Porter, C. E.—Descripción de un nuevo diptero chileno (*Agromyza gayi*), 406, viii, 56-7. Richardson, C. H.—The attraction of D. to ammonia, 180, ix, 408-413.

Alexander, C. P.—New nearctic crane-flies. Part II. [9 new], 4, 1917, 22-31 (cont.). Brues, C. T.—A new sp. of *Apiochaeta* from New England (Phoridae), 5, 1916, 175-6. Sturtevant, A. H.—Notes on N. Am. Drosophilidae with descriptions of 25 n. sps., 180, ix, 323-43. Townsend, C. H. T.—Miscellaneous muscoid notes and descriptions [8 n. gen.; 4 n. sps.]; *Lithohypoderma*, a new fossil genus of oestrids, 420, iv, 121-28; 128-30.

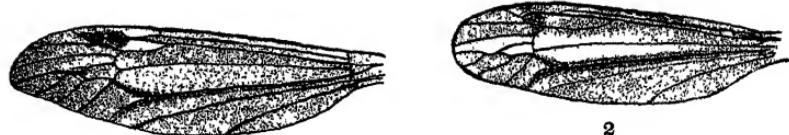
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Liljeblad, E.—New sps. of C. of the genus *Mordellistena* [8 new], 4, 1917, 9-18. Schaeffer, C.—New sps. of the family Elateridae [19 new], 6, xxiv, 256-67.

HYMENOPTERA. C., G. H.—Studies of H., 10, xcvi, 258. Cockerell, T. D. A.—The panurgine bees of the genera *Hesperapis*, *Zacea* and *Panurgomia*, 5, 1916, 176-78. Mickel, C. E.—A review of the American species of *Xylocelia* [7 new], 180, ix, 344-52. Pellett, F. C.—Life history and habits of *Polistes metricus*, 34, xxiii, 275-84. Turner, R. E.—Notes on fossorial H.—xxv. On new Sphecoidea in the British Museum, 11, xix, 104-13. Webster, R. L.—Notes on two strawberry slugs (*Empria fragariae*, E. *maculata*), 34, xxiii, 291-98. Wheeler, W. M.—Questions of nomenclature connected with the ant genus *Lasius* and its subgenera; A phosphorescent ant; Ants carried in a floating log from the Brazilian mainland to San Sebastian Island, 5, 1916, 168-73; 173-4; 180-83.

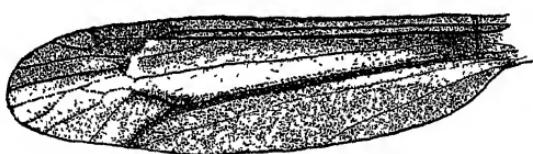
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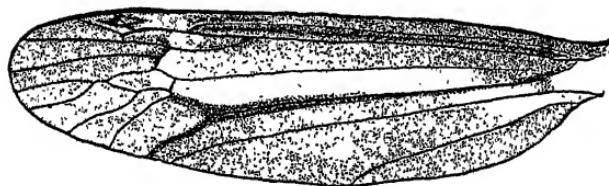


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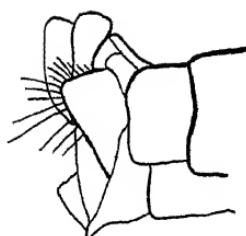
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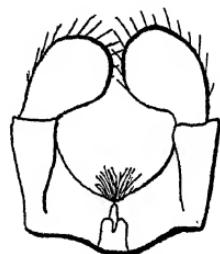
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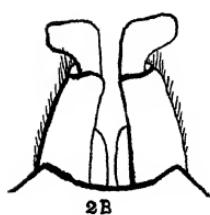
1A



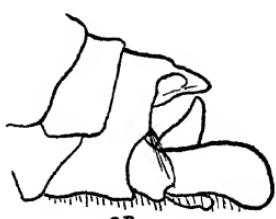
1B



2A



2B



3B



4A

1-1B, *TIPLA ALEXANDRIANA*; 2-2B, *T. VICINA*;
3-3B, *T. CONSPICUA*; 4, *T. XANTHOSTIGMA*.—DIETZ.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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Key to the North American Species of the Tricolor Group of the Dipterous Genus *Tipula Linnaeus*,

With Descriptions of Four New Species.

By W. G. DIETZ, M.D., Hazleton, Pennsylvania.

(Plate XI)

1. Joints of flagellum unicolorous brown
2. Joints of flagellum distinctly bicolored
3. Mesonotal praescutum without dark brown median line or stripe
4. Mesonotal praescutum with dark brown median line or stripe
5. Median mesonotal stripe broad
6. A narrow, median, mesonotal line
7. Stigma brown, wing picture darker....*fulvolineata* Doane (*graphica* Doane Syn.)
8. Basal six joints not as in the alternative.....
9. Mesonotal praescutum without dark brown median line or stripe
10. Mesonotal praescutum with dark brown median line or stripe
11. Median mesonotal stripe broad
12. A narrow, median, mesonotal line
13. Stigma brown, wing picture darker....*aspidoptera* Alexander¹
14. Stigma yellowish-brown, wing picture very pale, *comanche* Alexander²

¹Can. Ent. Vol. XLVIII, p. 49.

²Ibid. p. 50, placed here tentatively.

6. Costal stripe strongly bisinuate posteriorly *bella* Loew
Costal stripe not as in the alternative..... 7
7. Pleura with oblique, fuscous stripe..... *subeluta* Johnson
Pleura not as in the alternative 8
8. Median vitta of wing attains the apex..... 9
Median vitta not as in the alternative..... 12
9. Outer part of cell 1st M₂ and basal part of cell R₅ not hyaline.
Abdomen with lateral fuscous stripes 10
Cell 1st M₂ entirely hyaline. Abdomen without lateral stripes
..... 11
10. Larger, coloration of wing dark fuscous-brown, basal half of
cell M infuscate *caloptera* Loew
Smaller, color of wing grayish-fuscous, basal part of cell M
grayish *streptens* Loew
11. Cell M₁ and cell M₂ partially hyaline..... *conspicua* spec. n.
These cells entirely fuscous *eluta* Loew
12. Stigma yellow *xanthostigma* spec. n.
Stigma dark fuscous 13
13. The hyaline antestigmal spot extends as an irregular fascia to
near the posterior wing-margin *fraterna* Loew
The hyaline spot not as in the alternative..... 14
14. Thoracic stripes distinct *tricolor* Fabricius
Thoracic stripes obsolete *vitreata* Van der Wulp

***Tipula alexandriana* spec. n. (Pl. XI, fig. 1, 1A and 1B).**

Joints of antennal flagellum with the exception of the first, unicolorous, dark brown. Median vitta of praescutal mesonotum, divided by a pale stripe. Wings without fuscous costal stripe. The hyaline vitta does not extend beyond the extreme base of cell 1M₂.

♂.—Length 13-14 mm.; wing 16 mm.

Head grayish-white, middle of front fuscous, occiput suffused with fuscous. Joints 1-3 of palpi yellowish-fuscous, 4 dark fuscous. Frontal prolongation rather short, yellow, with a whitish bloom, and, like the nasus, beset with short blackish hairs. Antennae robust; extended backward they reach to the base of the abdomen; scapal joints and basal half of first flagellar joint, yellowish, the rest of the flagellum black, segments with well-marked basal and sub-apical enlargement, basal setae of moderate length.

Thorax. Pronotal scutum yellowish-fuscous. Mesonotal praescutum a sordid, pale yellow, stripes black, conspicuous, the median stripe narrowed posteriorly and divided by a moderately wide stripe of the ground color; lateral stripes abbreviated, parasutural foveae and antero-lateral margin of mesonotum black. Pronotal scutellum and pleuro-dorsal membrane yellowish. Pleura black, overlaid with a heavy whitish bloom, which almost completely conceals the ground color.

Scutum grayish-fuscous, darker in middle portion. Scutellum yellowish-fuscous. Postnotum grayish-fuscous, lateral margins pale. Halteres pale, knob fuscous.

Legs slender, coxae gray and beset with soft pale hairs; trochanters and basal part of femur yellow, remainder of femur yellowish-fuscous, dark fuscous at tip, tibiae and tarsi dark fuscous.

Wings grayish-fuscous, darker apically, yellowish at the base and along cell C and cell Sc, no fuscous costal stripe; stigma dark brown, preceded by a conspicuous hyaline spot; the vitta occupying cell M is but a shade paler than the ground color, not conspicuous, and does not extend beyond the extreme base of cell 1st M^2 ; vein Cu and its basal deflection conspicuously margined with fuscous.

Abdomen deep yellow, paler beneath with a conspicuous black stripe each side, the latter does not extend beyond the sixth segment; the seventh segment entirely yellow, the extreme posterior margin of segments 1-6 a trifle paler; 8 and hypopygium brown, appendages yellowish; eighth sternite simple, not emarginate; ninth tergite short, posterior margin feebly emarginate each side; ninth sternite with rounded emargination, from the lateral margin of which arises a pencil of bristle-like, yellowish hair, and a carina-like process at the base of the median suture; upper appendages broad, leaflike, inflexed, the lower appendages form an ascending irregular lobe.

♀.—Length 12 mm.; wing 19 mm. Aside from its larger size the female differs from the male by the much shorter antennae, which scarcely reach the middle of the mesonotum, first flagellar joint yellowish-red, flagellar joints cylindrical with slight basal enlargement. Ovipositor brown at base, blades yellow, upper valves very long, almost linear, the lower valves more than one-half the length of the upper valves.

Holotype, ♂. Foothills of Mt. Shasta, California, May 20th, 1914 (A. Kusche).

Allotype, ♀, May 26th, 1914, topotypic.

Paratype, ♂, Sonoma County, California, April 18th, 1914 (A. Kusche). All in the author's collection.

Readily distinguished from the other members of this group with unicolorous antennal flagellum; from *fulvolineata* Doane by only the three basal joints of the antennae yellow¹ and the veins in apical part of wing not margined with fuscous.

¹A male specimen in my collection from Los Cerritos, California, and received from Mr. M. C. Van Duzee, I unhesitatingly refer to this species, although only three basal joints of the antennae are yellow. The type of the species is a female.

From *aspidoptera* Alexander and *vicina* sp. n., by the pale median mesonotal line.

Two specimens, males, in my collection from La Junta, Colorado (E. J. Oslar), I refer to this species, though apparently differing. The head and thorax are dark brown, the mesonotal stripes black. This difference in color is due to the process of preservation. The abdominal stripes extend upon the seventh tergite.

Respectfully dedicated to Mr. Charles P. Alexander.

Tipula vicina spec. n. (Pl. XI, figs. 2, 2A, 2B.)

Grayish-brown. Antennal flagellum brown. Mesonotal stripes margined with fuscous, the median stripe divided by a blackish line. The hyaline vitta of the wing extends through cell 1st M^2 and cell R^5 to the apex.

♂.—Length 11.5 mm., wing 13 mm. *Head*—Grayish-brown, paler along the upper orbital margin, with dark median occipital line. Rostrum sordid yellow, nasus beset with whitish hairs. Palpi fuscous, the last joint shorter than the preceding joints together. Antennae slender; bent back, they reach to base of halteres; scapal and first flagellar joints yellowish-brown, the following joints fuscous, basal enlargement feeble, black, the setae shorter than the segments.

Thorax—Mesonotum grayish-fuscous with a yellowish sheen, the praescutal stripes scarcely darker than the ground color and margined with fuscous, the median stripe divided by a black median line; pronotal scutum brownish; scutellum and postnotum yellowish-brown. Pleurodorsal membrane sordid yellowish. Pleura gray with a whitish bloom. Halteres yellow at base, darker towards the club, the latter fuscous.

Legs yellow with whitish bloom; femora darker towards and infuscate at the apex; tibiae yellowish-fuscous, their apices and the tarsi fuscous.

Wings grayish-fuscous; the fuscous costal border includes the basal portion of cell R and all the radial cells except R^5 ; a small hyaline spot before the stigma, the latter dark brown; the hyaline vitta of cell M and outer part of cell R extends through cell 1st M^2 and cell R^5 to the apex; a conspicuous hyaline spot at apex of cell R and base of cell 1st M^2 ; vein Cu and its basal deflection margined with fuscous.

Abdomen above pale yellowish-gray, a broad, pale fuscous stripe each side, a black transverse line each side, behind the anterior margin of segments 2-5, lateral margins of segments broadly, the posterior margin very narrowly, paler, the former with a small brown dot on tergites 2-7; venter gray, yellowish towards the base. Eighth sternite

simple. Hypopygium yellowish-brown; the ninth tergite a little longer than wide and produced mesially into a short, obtuse lobe, the ninth sternite deeply divided, the postero-inferior angle produced; appendages yellowish-brown, the upper broad, irregular, the lower presents an oval, outward bent lobe.

♀.—Length 15.5 mm.; wing 14.5 mm. Antennae short, first joint grayish-brown, joints 2-4 reddish-brown, the remaining segments dark brown, scarcely darker at base. The dark dots on the pale lateral margins of the abdominal tergites less distinct. Ovipositor yellowish-brown, upper valves long and slender, lower valves about two-thirds the length of the upper, blade-shaped.

Holotype, ♂, Floodwood, Schoolcraft County, Michigan, July, 1915 (J. S. Rodger).

Allotype, ♀, topotypic.

Paratypes, one ♂ topotypic, one ♂ Lancaster, New York, May 31st, 1908 (M. C. Van Duzee). All in the author's collection.

Apparently close to *T. aspidoptera* Alexander, from which it is readily distinguished by the narrow median mesonotal line and all R⁵ entirely hyaline.

Tipula conspicua spec. n. (Plate XI, fig. 3, 3A, 3B).

Joints of antennal flagellum distinctly bicolored. Thoracic stripes margined with fuscous, the median stripe divided by a dark mesial line. The hyaline alar vitta reaches to the apex. Abdomen yellow without stripes.

♂.—Length 15.5 mm.; wing 17 mm. Head grayish-fuscous, a tuberosity behind the antennal insertion; face and frontal prolongation cream-yellow, nasus beset with short black hairs; sides of rostrum brownish. Palpi yellowish-brown, joints 1-3 pale at tip, the last joint shorter than the preceding joints together. Antennae slender; bent back, they reach to the base of the postnotum; scapal joints brownish with a whitish bloom above; flagellar joints slender, subcylindrical with a whorl of black setae, the latter shorter than the respective segments, yellow and, with the exception of the first joint, black at the base, with a whitish bloom.

Thorax.—Pronotal scutum gray with a crescentic, fuscous line. Praescutum grayish-white, stripes light-brown, margined with dark brown, the median stripe of equal width throughout and divided by a dark median line. Scutum brown, central part whitish. Scutellum sordid white, a trifle darker anteriorly. Postnotum sordid white, posterior margin darker, surface transversely rugulose, a brownish spot each side. Halteres yellowish-fuscous, paler towards the base, knob brown. Pleura and pleuro-dorsal membrane grayish-white.

Legs slender, yellowish-fuscous; femora and tibiae infuscate towards the tips; tarsi fuscous.

Wings grayish-fuscous, costal border, including cell R almost entirely and cells R^2 and R^3 dark fuscous, vein Cu narrowly, vein Cu^1 more broadly margined with fuscous; the hyaline vitta begins at the basal third of cell M and extends through cell 1st M^2 and the bases of cells M^2 and M^3 , and cell M^1 almost entirely to the apex; the dorsal border of cell R^5 is hyaline in its entire length and forms an integral part of the vitta; a conspicuous hyaline antestigmal spot extends to the apex of cell R; basal third of cell M infuscate, bases of cell Cu and cell 1 A hyaline.

Abdomen ochre-yellow without longitudinal stripes and rather faint, pale fuscous striae each side behind the anterior margin of tergites 2-4; tergites 5-8 somewhat infuscate, the eighth sternite simple. Hypopygium yellowish-brown, ninth tergite longer than wide, posterior margin incised each side, the median part somewhat compressed and produced in the form of a cone; from within the lateral incision arises a small inconspicuous pencil of stiff hairs; ninth sternite long, deeply and narrowly divided; upper appendages large, blade-like, incurved; the middle appendages flattened with an acute lance-shaped process, directed dorsad; the lower appendages irregular, ascending, and each ends in two small lobes.

Holotype, ♂, Black Mountains, North Carolina, September, 1913 (W. Beutenmueller). In the author's collection.

Closely resembles *Tipula eluta* Loew, but differs in cells M^1 and M^2 , being partially hyaline and the costal half of cell R^5 fuscous. The hypopygium is different in construction.

Tipula xanthostigma spec. n. (Pl. XI, fig. 4).

Yellowish-brown. Segments of antennal flagellum yellow, black at base. Thoracic stripes margined. The alar vitta extends into cell 1st M^2 but does not reach the apex; stigma yellow.

♀.—Length 19 mm.; wing 17 mm. Head grayish-yellow with dark occipital line, face yellowish, frontal prolongation yellow, nasus beset with blackish hairs toward the apex; rostrum light brown on the sides. Palpi light brown, darker towards the apex. Antennae short, scapal joints brownish, joints of flagellum yellow, black at base.

Thorax.—Pronotal scutum pale brown, a fuscous line each side. Praescutum yellowish-gray, stripes broad, light coffee-brown and almost entirely concealing the ground color and very narrowly margined with darker brown; the median stripe narrowed posteriorly and divided by a blackish line. Scutum pale coffee-brown, margins paler. Scutellum and postnotum yellow, posterior margin of the latter brownish. Pleurodorsal membrane grayish-yellow. Pleura and coxae yellowish with a white bloom. Halteres pale, knob fuscous.

Legs—Trochanters and femora yellowish, the latter infuscate towards the apex, tibiae and tarsi yellowish-fuscous, darker towards the apices.

Wings light grayish-fuscous, costal border brown; stigma sordid yellow; basal half of vein Cu narrowly, remainder and the basal deflection more widely, margined with fuscous; a dark-brown spot at the bases of cells R⁴ and R⁵; the hyaline vitta begins near the base of cell M and extends into the base of cell 1st M², the cells bordering the latter, pale, narrowly margined with hyaline; the very conspicuous antestigmal hyaline spot extends into the base of cell 1st M².

Abdomen sordid yellow, a broad fuscous stripe each side extends from the base to the eighth tergite, the two stripes leave but a narrow vitta of the ground color between them. Ovipositor ferruginous, upper valves strongly narrowed towards the apex, lower valves a little wider and about three-fifths the length of the upper valves.

Holotype, ♀, Chimney Gulch, Colorado, June 9th, 1914. (E. J. Oslar). In the author's collection.

Readily distinguished from the other species of the group with bicolored, flagellar joints and the alar vitta not attaining the apex, by the yellowish stigma.

EXPLANATION OF PLATE XI.

- 1.—Wing of *Tip. alexandriana* spec. n.
 - 1 A.—Lateral aspect of hypopygium of same.
 - 1 B.—Ventral aspect of hypopygium of same.
 - 2.—Wing of *Tip. vicina* spec. n.
 - 2 A.—Lateral aspect of hypopygium of same.
 - 2 B.—Ventral aspect of hypopygium of same.
 - 3.—Wing of *Tip. conspicua* spec. n.
 - 3 A.—Dorsal aspect of hypopygium of same.
 - 3 B.—Lateral aspect of hypopygium of same.
 - 4.—Wing of *Tip. xanthostigma* sp. n.
-

Egg-masses of the Vaporer Moths Wanted (Lep.).

I am venturing to appeal for help in connection with some studies in heredity I am making. I am studying the inheritance of the hair pencils in the larvae of the Vaporer Moths and am very anxious to get egg masses of the Vaporer Moths, *Orgyia (Notolophus) vetusta* and *O. badia* found on the Pacific coast and also of any other *Orgyia* found in the West. Furthermore, I want to study the gametogenesis, especially the spermatogenesis, of these species and also the behavior of the mitochondria.

In return I shall be pleased to do all I can and I can assist in practically every group of animals or plants.—J. W. H. HARRISON, 181 Abingdon Road, Middlesbro', England.

On *Coelophyllum simplex* and certain of its Allies (Orthoptera, Tettigoniidae).

By JAMES A. G. REHN, Academy of Natural Sciences, Philadelphia, Pa.

(Plate XII)

In 1875, Scudder described from the Peruvian Marañon a very peculiar katydid, which he called *Coelophyllum simplex*, new genus and species.¹ These names were not mentioned again until 1896, when Scudder² said: "*Coelophyllum* is a genus of Phaneropterinae, not recognized by Brunner in his monograph or in the supplement to it, and which seems to be most nearly allied to the Old World genera forming his group Holochlorae, though very different from either of the three genera recognized by him." Kirby, in 1906, placed³ the genus in the vicinity of *Phaneroptera*, while Bruner, in 1915, in a key to the American genera of the Phaneropterinae,⁴ apparently follows Scudder's suggestion as to its position, as he gives as its diagnostic feature a character which differentiates the Holochlorae and certain other Old World genera groups. This feature is: "Anterior tibiae on their inner margin with the auditory foramina shell-like or sublinear, externally typically wide open."

We now have before us the unique female type of Scudder's genus and species, which we find to be generically inseparable from Brunner's *Prosagoga*, erected, three years later than Scudder's genus, on a species from Surinam.⁵ The insect is a most peculiar one, with the tegminal shape and structure, form of the head and pronotum, folding of the wings and structure of the ovipositor quite distinctive. The foramina of the cephalic tibiae are open normal width caudad, while cephalad they are narrowly open, with a trace of a conchate development ventrad, but this is weakly indicated and the surface of the membrane is plainly visible, not fully covered over by the bulla as in forms typically conchate ("shell-like") or linear.

¹ Proc. Boston Soc. Nat. Hist., XVII, p. 263.

² Ibid., XXVII, p. 210.

³ Synon. Catal. Orth., II, p. 437.

⁴ Ann. Carneg. Mus., IX, p. 289.

⁵ Monogr. der Phaneropt., pp. 29, 320, (1878).

It is quite evident the genus is a modified member of the American group Phyllopterae, and not an isolated American representative of the Old World Holochlorae assemblage. In addition the exact form of the cephalic face of the tympanum of the cephalic tibiae is not a generic feature, as it varies in form within the genus, of which eight species are before us.

We are elsewhere recording or describing, in studies of Brazilian Orthoptera, material of three of the species of the genus. Of the section of the genus represented by *crenulatum* alone in Brunner's last key to the species of the genus,⁶ we now have before us five species: *crenulatum* (Brunner), *simplex* Scudder and three other new species. These forms all agree in the important features given in the key for *crenulatum*, i. e. the ramus of the median vein of the tegmina diverging before the middle; in the anal vein (posterior ulnar of Brunner) being acute and crenulate in the male and obtuse in the female, there crenulate only at the base; in the caudal femora being unarmed on the ventro-internal margin.

The five forms may be differentiated from one another by the following features:

- A. Marginal field of the tegmina regularly narrowing in width distad, at distal fifth equal to decidedly less than one-half the greatest tegminal width; apex of tegmina rounded or subrectangulate.
- B. Pronotum more robust, less compressed, the greatest caudal width of the disk contained one and one-third times in the greatest length of the same. Tegmina with the ramus of the median vein furcate at its middle; free margin of the stridulating field of the male tegmina rectangulate produced at the apex of the stridulating vein; base of the ulnar vein of the tegmina strikingly marked with black.

amazonicum new species.

- BB. Pronotum less robust, more compressed, the greatest caudal width of the disk contained one and one-half times in the greatest length of the same. Tegmina with the ramus of the median vein furcate proximad of its middle; free margin of the stridulating field of the male tegmina obtuse-angulate produced at the apex of the stridulating vein; base of the ulnar vein of the tegmina not strongly marked with black.

⁶ Verhandl. K.-K. Zool.-bot. Gesell. Wien, XLI, pp. 169-170, (1891).

C. Costal margin of the tegmina arcuate distad; general form of the tegmina elongate elliptical. Eyes proportionately larger; face more compresso-bullate. Limbs relatively longer.

D. Size smaller (δ tegminal length 32-33 mm.). Tegmina proportionately narrower, the greatest width contained more than two and one-half times in the greatest length of the same. Head proportionately narrower, fastigium of vertex more acute.

crenulatum (Brunner).

DD. Size larger (δ tegminal length 39-40.5 mm.). Tegmina proportionately broader, the greatest width contained not more than two and one-half times in the greatest length of the same. Head proportionately broad, fastigium of vertex less acute.

costaricense new species.

CC. Costal margin of the tegmina obtusely rounded at distal third; general form of the tegmina having the costal and sutural margins approximately parallel. Eyes proportionately smaller; face less bullate, hardly compressed. Limbs relatively shorter *peruvianum* new species.

AA. Marginal field of the tegmina very wide, slightly expanding distad, at distal fifth equal to but faintly less than one-half the greatest tegminal width; apex of the tegmina very obtuse-angulate. (Size largest of the species seen. Head strongly compressed; face greatly compresso-bullate.) *simplex* Scudder.

***Coelophyllum amazonicum* new species. (Pl. XII, fig. 1.)**

Of the members of this group of the genus, *amazonicum* is characterized by the combination of a broadly rounded tegminal apex, a distad narrowing marginal field of the tegmina, a median bifurcation of the tegminal ulnar vein, a rectangulate production of the free margin at the apex of the stridulating vein of the male tegmina and the broad, but moderately compressed pronotum. The type has been dried after immersion in a liquid preservative and, in consequence, has lost almost all of its original coloration. The only features of this preserved are small semilunate spots of black situated at the base of the ulnar and anal veins of the tegmina.

Type.— δ ; Contamano, Rio Ucayali, Peru. October to December, 1912. [Acad. Nat. Sci. Phila. Type No. 5312.]

Size small (for the genus); form moderately compressed; surface smooth, of tegmina shining, very closely, finely and deeply cibroso-punctulate.

Head with the interocular space slightly less than the greatest width of the eye; fastigium acute, depressed, sulcate, the apex well separated from the fastigium of the face; paired ocelli large; fastigium of the face distinctly acuminate; face considerably bullate, moderately compressed; eyes ovate in basal outline, compressed, distinctly directed cephalad; antennae surpassing the apices of the tegmina.

Pronotum with the greatest caudal width of the disk contained one and one-third times in the greatest length of the disk, the same moderately narrowing cephalad; cephalic margin of the disk very shallowly and broadly obtuse-angulate emarginate, caudal margin of the disk very broadly arcuate, faintly flattened mesad; lateral margins of the disk rather broadly rounding into the lateral lobes: lateral lobes of the pronotum with the greatest depth slightly more than the greatest length; cephalic margin of the lobes moderately arcuato-sinuate caudad of the eyes; caudal margin regularly and considerably arcuate, the humeral sinus deep, rounded acute-angulate; ventral margin of the lobes with the cephalic section oblique truncate; ventro-cephalic angle rounded obtuse-angulate, ventro-caudal angle indistinguishable in the regular curve of the caudal section of the ventral and the caudal margins.

Tegmina surpassing the apices of the caudal femora by considerably more than the length of the pronotal disk; greatest width of the tegmen contained about two and two-thirds times in the greatest length of the same; form of the tegmina elongate elliptical, slightly prolonged proximad, the distal half more regular in form: costal margin briefly oblique sinuato-truncate proximad, thence rounding into the arcuato-truncate costal margin proper, which regularly rounds distad to the broadly rounded apex; sutural margin (aside from stridulating field) moderately arcuate: marginal field broad, narrowing distad, the greatest proximal width but little less than half the greatest width of the tegmen; mediastine vein weak, bifurcate; discoidal vein in general straight, with regular oblique rami diverging toward the costal margin; median vein with the ramus diverging briefly proximad of the middle, this bifurcate mesad; ulnar vein at the closest point separated from the humeral trunk by one-half the distance separating it from the sutural margin at the point of their greatest remoteness; cross-veins of the discoidal field regular (see figure): stridulating field relatively short and very broad, the free margin produced into a rectangular process at the apex of the stridulating vein; distad of this the margin is sinuato-emarginate; stridulating vein straight, quite thick, sulcate; base of ulnar vein very distinctly paucicrenulate, proximad of

the crenulations is a detached rounded area. Wings very faintly surpassing the apices of the tegmina.

Disto-dorsal abdominal segment with its distal margin arcuate, moderately emarginate at the bases of the cerci; supra-anal plate acute-trigonal, faintly sulcate; cerci in their greater portion tapering, gently curving dorsad, the apex rather sharply curved dorso-mesad, briefly mucronate; subgenital plate produced, narrowing, distal margin U-emarginate, styles relatively short, articulate.

Cephalic femora with two to three spines on the ventro-cephalic margin; median femora with three to four spines on the same margin; cephalic tibiae with slender distal portion faintly longer than the inflated proximal section. Caudal femora equal to one-half the tegminal length, moderately tapering; ventro-external margin with fifteen to seventeen spines distributed over its whole length, ventro-internal margin with three to five spines on distal half.

Natural coloration of specimen destroyed by liquid immersion except for the following features. Eyes mars brown. Semilunate spot encircling the detached rounded knob at the base of the ulnar vein of the tegmina, black; stridulating vein prout's brown; distal section of the sutural margin of the tegmina bearing several well separated groups of dark points, such as are found more decided in certain other forms of this species group.

Length of body, 19.5 mm.; length of pronotum, 5.5 mm.; greatest (caudal) width of pronotal disk, 4.3 mm.; length of tegmen, 28.5 mm.; greatest width of tegmen, 11.9 mm.; length of caudal femur, 15 mm.

The type is unique.

***Coelophyllum crenulatum* (Brunner). (Pl. XII, fig. 2.)**

1891. *Prosagoga crenulata* Brunner, Verhandl. K.-K. Zool.-botan. Gesell. Wien, XLI, pp. 170, 171. [Pernambuco and Alto Amazonas, Brazil; Guiana.]

We have before us a single male of this species from Caparo, Trinidad (June, 1913; S. M. Klages), belonging to the collection of the Academy of Natural Sciences of Philadelphia. It can be readily differentiated from *amazonicum* by the characters given in the key, but from *costaricense* the distinctions are not as easy to appreciate. Under *costaricense* we have given the diagnostic features separating the two forms.

***Coelophyllum costaricense* new species. (Pl. XII, fig. 3.)**

This new species is quite close to *C. crenulatum* (Brunner), from which it differs in its larger size, proportionately broader tegmina, somewhat less compressed pronotum and broader

head, with less acute facial fastigium and more robust limbs. The male subgenital plate is also broadly V-emarginate instead of rather deeply emarginate, as in *crenulatum*.

Type.—♂; Cachi, Costa Rica. July 16, 1911. (C. H. Lankester.) [Acad. Nat. Sci., Phila., Type No. 5311.]

Size moderately large; form compressed; surface smooth, of tegmina as in *amazonicum*.

Head with the interspace between the eyes faintly greater than the greatest width of the eye; fastigium acute but immediate apex rounded, undulate depressed, moderately sulcate, apex well separated from the fastigium of the face; paired ocelli large; fastigium of the face relatively acute; face very considerably bullate, rather strongly compressed; eyes ovate in basal outline, moderately compressed, directed cephalad; antennae elongate.

Pronotum moderately compressed (less so than in *C. crenulatum*), the disk narrowing cephalad with its greatest caudal width contained one and two-fifth times in the greatest length of the same; cephalic margin of the disk faintly sinuato-emarginate, caudal margin of the disk strongly arcuate, with a faint median emargination, lateral margins of the disk distinct and continuous, but broadly rounded: lateral lobes of the pronotum with their greatest depth faintly greater than their greatest length; cephalic margin of the lobes sinuate, ventrocephalic angle rounded obtuse-angulate, ventral margin strongly arcuate, faintly flattened cephalad, caudad rounding regularly into the arcuate caudal margin, which is faintly flattened mesad, humeral sinus subacute, deep, with the angle narrowly rounded.

Tegmina surpassing the apices of the caudal femora by twice the length of the pronotal disk; greatest width of the tegmen contained two and one-half times in the greatest length of the same; form of the tegmina elongate-elliptical, slightly prolonged proximad; costal margin as in *amazonicum*, but the distal fourth is oblique arcuatotruncate to the rounded rectangulate apex; sutural margin as in *amazonicum*: marginal field broad, regularly and very considerably narrowing distad, the greatest proximal width but little less than half the greatest width of the tegmen; mediastine vein subobsolete, irregular, bifurcate; discoidal vein faintly flexuous, with rami toward the costal margin somewhat irregular in position, furcation and trend; median vein with the ramus diverging decidedly proximad of the middle, this bifurcate shortly before its middle; ulnar vein at the closest point separated from the humeral trunk by not more than one-third the distance separating it from the sutural margin at the point of greatest remoteness; cross-veins of the discoidal field much suggesting those of *C. amazonicum*, but fewer (see figure): stridulating field relatively narrow, of medium length, the free margin rounded

obtuse-angulate at the apex of the stridulating vein, distad of this the margin is sinuate; stridulating vein much as in *amazonicum*; base of ulnar vein quite weakly but rather closely crenulate, proximal section less decidedly than in *amazonicum*. Wings very faintly surpassing the apices of the tegmina.

Distro-dorsal abdominal segment with free margin much as in *amazonicum*, but median emargination less extensive; supra-anal plate?; cerci of the type found in *amazonicum*, but more incrassate proximad and more slender distad; subgenital plate moderately produced, moderately narrowing, distal margin broadly V-emarginate, styles short, articulate.

Cephalic femora with three spines on the ventro-cephalic margin; median femora with two to three spines on the same margin; cephalic tibiae with slender distal portion slightly longer than the inflated proximal section. Caudal femora less than one-half the tegminal length, moderately robust proximad, considerably tapering distad; ventro-external margin with twelve to thirteen spines distributed over its whole length, ventro-internal margin unarmed.

General coloration of tegmina yellowish oil-green, of the abdomen citron-yellow, of the head and pronotum pale old gold (type) or the tegminal color (paratype). Head with the face whitish, a distinct narrow postocular line bone brown; eyes mottled russet and mummy brown; antennae with the proximal and second joint of the color of the face, remaining joints suds brown, imperfectly multiannulate with threads of argus brown. Pronotum with the caudal section of the disk and lobes washed with greenish; vicinity of the humeral sinus and the median emargination of the caudal margin touched with mummy brown. Tegmina with (type) or without (paratype) three areas of pseudo-desiccation, of a prout's brown tone, these occasionally outlined in fuscous, and one situated near the base of the ulnar vein, another at the base of the median ramus and divided by the ulnar vein, and the third and largest at the bifurcation of the median ramus; in place of these areas the tegmina (paratype) may have numerous scattered fine points of fuscous; distal section of costal margin, and to a lesser degree of the sutural margin, beaded with mummy brown; bounding section of the stridulating field and stridulating vein marked with mummy brown. Limbs ranging from old gold to dull ochraceous-buff, the tibiae and distal extremity of the femora thickly speckled with fine points of fuscous, which are almost entirely absent from the ventral and lateral faces of the caudal tibiae.

Measurements (in millimeters).

Cachi, Costa Rica	Length of body	Length of pronotum	Greatest (caudal) width of pronotal disk	Length of tegmen	Greatest width of tegmen	Length of caudal femur
Type.....	26	7.2	5 ²	39	15.8	16.5
Paratype.....	22.2	7.1	5	40.5	15.6	16.1

In addition to the type we have before us, from the Academy collection, a paratypic male from Cachí, Costa Rica, taken by Mr. Lankester in January, 1914. This specimen shows no really noteworthy differences from the type except in color, which is mentioned in the above description.

***Coelophyllum peruvianum* new species. (Pl. XII, fig. 4.)**

Closely allied to *C. crenulatum* and *costaricense*, but more particularly to *costaricense*, from which it differs chiefly in the distinct and relatively abrupt obtuse-angulation at the distal third of the costal margin of the tegmina, in the more subparallel major portions of the costal and sutural margins of the same, in the smaller eye, in the less bullate and more weakly compressed face, and in the shorter limbs. The tegminal form is fully diagnostic of this species.

Type.—♂; Chanchamayo, Peru. [Acad. Nat. Sci., Phila., Type No. 5310.]

Size moderately large; form compressed; surface smooth, of the tegmina as in *amazonicum* and *costaricense*.

Head with the interspace between the eyes subequal to the greatest width of the eye; fastigium acute, immediate apex narrowly rounded, undulate depressed, deeply but narrowly sulcate, apex well separated from the fastigium of the face; paired ocelli large; fastigium of face relatively acute; face moderately bullate, appreciably but not greatly compressed; eyes broad ovate in basal outline, moderately compressed, directed cephalad; antennae elongate.

Pronotum moderately compressed, the disk as in *C. costaricense*; lateral lobes as in *costaricense*, but the humeral sinus is shallower and more rectangulate, with the angle more broadly rounded.

Tegmina as in *costaricense*, except for the following differences: Narrower, the greatest width contained faintly more than two and one-half times in the greatest length of the same; costal and sutural margins in large part subparallel; costal margin with the distal third quite sharply oblique truncate to the apex, which is narrowly rounded rectangulate; sutural margin straighter than in *costaricense*: stridulating field relatively shorter and broader than in *costaricense*, the free margin more arcuate distad of the stridulating vein. Wings very faintly surpassing the apices of the tegmina.

Disto-dorsal abdominal segment as in *costaricense*; cerci of the usual type but more slender than in *costaricense*, less incrassate proximad and tapering more regularly; subgenital plate of the type usual in the genus, the distal margin U-emarginate.

Limbs shorter and faintly more slender than in *C. costaricense*. Cephalic femora spined as in *costaricense*; median femora with three spines on the ventro-cephalic margin; cephalic tibiae much as in *costaricense*. Caudal femora considerably less than one-half as long as the tegmina, slightly less robust than in *costaricense*; ventro-external margin with nine to eleven spines distributed irregularly over their whole length, ventro-internal margin unspined.

General color of tegmina oil green, the body and (occasionally) the proximal portion of the tegmina sulphine yellow (type) to dull light cadmium yellow (paratype). Eyes auburn to chestnut brown; a fine postocular line of bay more (type) or less (paratype) distinctly indicated on the head. Pronotum occasionally (type) washed with greenish caudad. Tegmina with three groups of discoidal maculations; the first, which is at the proximal third, is composed of two mummy-brown points, either or both of which may be ocelliform with a buffy centre, one placed at the sutural side of the principal furcation of the median vein, the other on the same side of the ulnar vein; median group, placed slightly distad of the middle, having a weak buffy base and three closely placed spots (the third—sutural—is occasionally subobsolete), which may be ocelliform; the third group placed along the distal fork of the principal ramus of the median vein, at the distal fourth, consisting of a buff line along the vein and on which may or may not be placed two or three mummy-brown points; distal half of costal margin mummy brown, regularly and sparsely beaded with warm buff, which also occasionally colors the tegminal tips; distal section of the sutural margin weakly marked in similar fashion; sutural field washed along the principal veins with mummy brown, this tone strong near the ulnar base. Limbs of the general body color, the tibiae and femora marked as in *costaricense*, more weakly in the paratype than in the type.

Measurements (in millimeters).

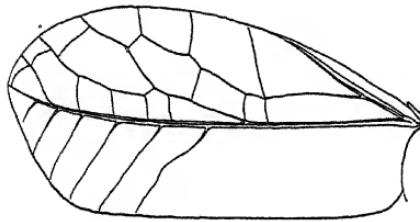
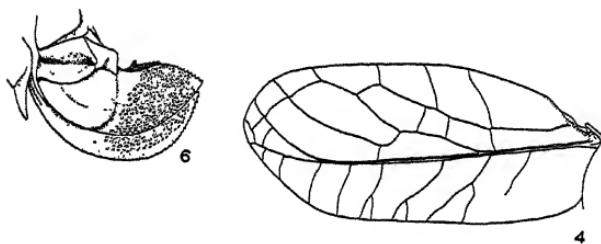
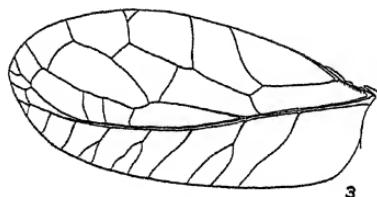
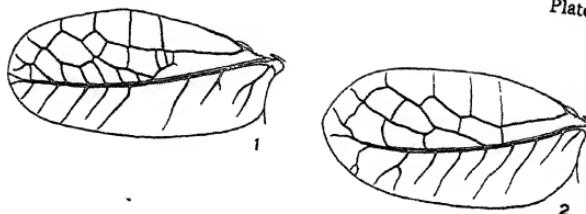
Chanchamayo, Peru	Length of body	Length of pronotum	Greatest (caudal) width of pronotum	Length of tegmen	Greatest width of tegmen	Length of caudal femur
♂ Type.....	21.4	6.8	4.8	37.2	14	15.4
♂ Paratype.....	20.3	6.6	4.9	37.8	14.3	15.1

In addition to the type a paratypic male from Chanchamayo, also in the Academy collection, is now before us. This specimen shows no important differences from the type, except for the color features mentioned above.

***Coelophyllum simplex* Scudder.** (Pl. XII, figs. 5 and 6.)

1875. *Coelophyllum simplex* Scudder, Proc. Boston Soc. Nat. Hist., XVII, p. 263. [Peruvian Marañon.]

The unique type of this species, as stated by Scudder, has,



COELOPHYLLUM.—REHN.

- 1.—*C. AMAZONICUM*.
2.—*C. CRENULATUM*.
3.—*C. COSTARICENSE*.
4.—*C. PERUVIANUM*.
5, 6.—*C. SIMPLEX*.

by immersion in some liquid preservative, lost all of its original coloration, excepting the dark distal section of the ovipositor. The species is the largest member of this group and probably of the genus. This statement, however, may require modification when both sexes of all the described species are known.

The extensive character of the marginal field of the tegmina and the form of the tegminal apices are quite characteristic of this species, while the compression of the head and the bullation of the face are marked to an exceptional degree.

Type measurements: length of body (exclusive of ovipositor), 25.3 mm.; length of pronotum, 8.2 mm.; greatest (caudal) width of pronotum, 6.4 mm.; length of tegmen, 42.8 mm.; greatest width of tegmen, 19 mm.; length of caudal femur, 18.2 mm.; length of ovipositor, 6.5 mm.

The ovipositor structure of this individual, the only female of this species group known to us, is so striking it seems desirable to figure it. To what degree the other forms of the group exhibit a similar imbricated structure of the ovipositor surface remains to be determined.

EXPLANATION OF PLATE XII.

Outline of tegmen (lateral aspect). ($\times 1\frac{1}{2}$.)

Fig. 1.—*Coelophyllum amazonicum* new species. ♂ Type. Contamano, Peru.

Fig. 2.—*Coelophyllum crenulatum* (Brunner). ♂. Caparo, Trinidad.

Fig. 3.—*Coelophyllum costaricense* new species. ♂ Type. Cachi, Costa Rica.

Fig. 4.—*Coelophyllum peruvianum* new species. ♂ Type. Chanchamayo, Peru.

Fig. 5.—*Coelophyllum simplex* Scudder. ♀ Type. Peruvian Ma-rañon.

Outline of ovipositor (lateral aspect). ($\times 4$.)

Fig. 6.—*Coelophyllum simplex* Scudder. ♀ Type. Peruvian Ma-rañon.

Influence of Rainfall on Abundance of a Moth (Lep.).

Results of several years' observations in Louisiana, Cuba, Jamaica, Trinidad and Barbados and careful status examination for two years in Porto Rico show that the abundance of the Sugar-Cane Moth Stalk Borer (*Diatraea saccharalis*) varies inversely with the rainfall.—G. N. Wolcott, University of Illinois.

Mating Habit of the Cottony Cushion Scale (Hem., Hom.).

By G. O. SHINJI, Berkeley, California.

While studying the life history of the cottony cushion scale (*Icerya purchasi*) for a certain experimental purpose, our attention was called to a peculiar process of mating exhibited by this insect. So far as our knowledge goes the mode of mating in the cottony cushion scale has never been described. It is, therefore, thought that the present paper may not be out of place.

The adult male, soon after the last molting, folds his wings flat on his back and remains inactive for a period of about three days. Then, either early in the morning, or, more generally, on a warm, dusky evening, he crawls on a nearby twig to search for his mate. As soon as he finds a mature and yet virgin female, he crawls on her back, pats her abdomen with the tip of his genital prominence two or three times, and then slowly and gently slips alongside of his mate, but never across her head. Then he proceeds directly toward the upper end of the twig or the branch, as the case may be. At the end of the twig he turns around and comes back to the female again. If at this time the bride he engaged signifies her acceptance by elevating her abdomen from the surface of the twig, a copulation takes place; if not, he repeats the same process several times. In three instances we have observed the male, after the second approach to the female, which has not yet responded, try successfully to dislodge her abdomen from the twig by the use of his front pair of legs. However stubborn females seemed to be at first, they yielded to his wishes in the long run, and a copulation resulted.

Altogether, in thirty-two copulations observed so far, the process was practically the same; he curls his abdomen up and around the posterior end of the female until the penis is inserted into the genital aperture of the female. This process is made possible by his holding himself on the fringe of the female by the hind legs, and also by the support of the wings, which are placed firmly against the twig. No movement of

antennae or of the wings was observed. While they are in copula his antennae are dropped freely downward, making a right angle with the long axis of the body. The first two pairs of legs are, on the contrary, stretched upward, making also a right angle with the line of the body. The hind legs, as already mentioned, hold the posterior portion of the female's abdomen, while the wings are held in such a manner as to embrace the twig between their distal ends.

One of the characteristic features observed in the copulation of the cottony cushion scale is, then, the right-angularity presented in the relative position of the male and female, and also of several parts of the male. Both the antenna and the legs of the male are each perpendicular to the body and the body itself (of the male) is, in turn, at a right angle with that of the female. In this respect the manner of copulation in *Icerya purchasi* differs from what has been observed in other animals. Mr. Putnam,¹ who observed the process in the cottony maple scale, *Pulvinaria innumerabilis* Rathv., states: "the male mounts the back of the female with his head in the same direction with the female's and vibrating his antennae rapidly." Mr. Turner² observed a similar manner in one of the parasitic bees (Stelidae). Among other animals, Amphibia, for example, agree in the main with the type of copulation mentioned by Turner. My personal observations on *Sinea diadema*, *Zelus socius*, most of the Aphids, *Murgantia histrionica*, certain Capsids, *Meloe*, *Hippodamia convergens*, *Diabrotica soror* and *Musca domestica* among insects, and also on other invertebrate, as well as vertebrate, animals, all agree with the type of copulation exhibited by the cottony maple scale, i. e., the male mounts the back of the female with his head in the direction of the female's. Certain Lepidopterous insects, the silk-worm moth, for example, are often observed in copula with the head of the male turned exactly in the opposite direction from that

¹Putnam, J. Duncan. Biological and other notes on Coccidae. I. *Pulvinaria innumerabilis*. Proc. Davenport Acad. of Nat. Sci., vol. II. Dec., 1879.

²Turner, C. H. Notes on the behavior of a parasitic bee of the family Stelidae. The Journal of Animal Behavior, vol. I, No. 5. 1911.

of the female. But even in this case the body of the male and that of the female are in the same line. In other words, in the process of mating in all the animals above mentioned, except that which I found so far in a single species of scale insect, the bodies of male and female are arranged either in the same or in opposite directions, with of course, slight modifications, as against the exact perpendicularity observed in the case of the cottony cushion scale.

The relative time spent in the courting, if we may term the behavior of the male visiting the female prior to the mating as such, and the actual time spent in copula are as follows:

Male No. 1 emerged Feb. 3, 10.30 A. M.; died Feb. 10, 10.25 A. M.

Mating I, February 7:

Located female	3.00 P.M.	In copula	3.06-3.13
Left her	3.04½	Turned body	3.13
Returned	3.06	Left her	3.14

Male No. 2 emerged Feb. 8, 10.00 A. M.; died Feb. 16, 9.10 A. M.

Mating I, February 13:

II, February 13:

Courting	4.20-4.30 P.M.	Courting	5.25-5.32 P.M.
In copula	4.32-4.40	In copula	5.32-5.42

Male No. 3 emerged Feb. 8, 9.45 A. M.; died Feb. 16, 9.12 A. M.

Mating I, February 13: In copula.....4.40-4.48 P.M.

Male No. 4 emerged Feb. 12; died Feb. 19.

Mating, February 15: Courting4.25-4.36 P.M.
In copula4.36-4.44

Male No. 5 emerged Feb. 12 (?); died Feb. 19.

Mating I, February 15: II, February 15.

Courting	4.40-4.48 P.M.	Courting	5.30-5.45 P.M.
In copula	4.48-4.57	In copula	5.55-6.07

Struggled to leave, 4.58-5.08

Left her5.15

Male No. 6.

Mating I, March 2: Courting4.25-4.43 P.M.
In copula5.55-6.07

Male No. 7 emerged March 3, 10.00 A. M.; died March 10.

Mating I, March 6:

In copula .3.40-3.48 P.M.	V. Courting	7.55-8.05 P.M.
II. In copula .4.35-4.48	In copula	8.05-8.13
III. In copula .5.45-5.55	VI, March 7:	
IV. Courting ..6.55-7.05	Courting	7.20-7.36 A.M.
In copula .7.05-7.13	In copula	7.36-7.45

Male No. 8.

Mating I, March 10: Courting .....	.....	3.35-3.47 P.M.
In copula .....	.....	3.47-3.55

Male No. 9.

Mating I, March 10:

In copula ..	3.50-3.57 P.M.	III. In copula	5.40-5.50 P.M.
II. Courting ..	4.47-5.01		
In copula ..	5.01-5.10		

Male No. 10 emerged March 8.

Mating I, March 11: Courting .....	.....	2.33-2.44 P.M.
In copula .....	.....	2.47-2.54

It is interesting to note from the above figures that there exists a certain periodicity in the process of mating. There occurred in almost all cases one copulation in an hour, no more and no less. This definiteness in time is also observable in the courting and in the copulation, the average time spent being about ten and seven minutes, respectively. The same table also shows the fact that the males do mate with more than one female, to as many as six.

Another very interesting fact observed in this connection is that which pertains to the function of the wings and balancers of the male. Since, as Mr. Gossard³ stated, the male rarely takes to flight, the wings of this male scale insect are of more use as the support for the body during the process of copulation. In this explanation we see the significance of the presence of a highly modified pair of balancers. The balancers of this insect end each with a hooklet, with which they hold on the wings and strengthen the latter.

If the wings are useful for flight only this elaborate process on the balancers may not be necessary. Dipterous insects possess, as we know, a pair of balancers, but with no hooklet. They nevertheless fly as easily as other insects do. The balancers of the cottony maple scale again are lacking in these hooklets. Reasoning thus, I am inclined to believe that the balancers of the cottony cushion scales, whatever their original function might have been, have been so modified as to strengthen the wings during the process of copulation.

³Gossard, H. A. The Cottony Cushion Scale. Florida Agri. Expt. St. Bull. No. 56, May, 1901.

Notes on some Buprestidae of Northern California (Col.).

By W. J. CHAMBERLIN, Forest Entomologist, Oregon State College, Corvallis, Oregon.

(Continued from page 139)

44. *Polycesta californica* Lec.

Found throughout the oak region of California, though never common. It has been taken from dead black oak (*Quercus kelloggii*) in Trinity County, Yosemite Valley and Mariposa County; also taken from *Quercus douglasii*.

45. *Chrysophana placida* Lec.

Found throughout the coniferous area of northern California and the Sierras, also well distributed over western Oregon, and no doubt extends into Washington, since the writer has taken it 35 miles south of the Columbia River. Dr. Van Dyke has one specimen bred from the cones of *P. ponderosa*. Mr. Miller, of the Ashland Station, has bred it from the cones of *Pinus attenuata*. Its common host plant is Douglas fir, but it also breeds in the upper part of small lodge pole, yellow and knob-cone pine, and in the edges of fire scars of *Abies concolor* and *A. magnifica*.

There are three phases: a striped phase, which is the more common, and is often taken in open fields on flowers in southern Oregon; an all-green variety, which occurs at higher elevations of the middle and southern Sierras, and which the writer has taken at Corvallis, Oregon; the third variety is unstriped, of a dark bronze or black color, and very scarce.

Dr. E. C. Van Dyke, of the University of California, has very kindly furnished me with his own notes on the hosts, etc., of species he has taken in the northern part of the State. I wish, particularly, to express my indebtedness to Dr. Van Dyke for his notes on the genus *Acmaeodera*; practically all the information on that genus is due to his observations, since I have personally come in contact with but two species, *A. vandykei* and *A. connexa*.

46. *Acmaeodera angelica* Fall.

"Generally to be found flying about brush or in the flowers

of Yerba Santa, *Erydectylon*. Very common in the Sierra Madre range of southern California, but also extends northward. I have specimens from the following more northern localities: Mariposa County, Lake County and Lake Tahoe."

47. *A. hepburnii* Lec.

Very common in most parts of California. Generally to be taken in flowers, such as certain compositae like *Baeria* and in the flowers of the evening primrose.

48. *A. acuta* Lec.

Perhaps even more common than the preceding and found in similar places, also as widely distributed. There are two phases, the common one, where the markings are broken up, and the other, where definite stripes are formed.

49. *A. connexa* Lec.

"Probably the most common species which we have in the State and widely distributed. Usually found in flowers like the two preceding. I have also dug it out of its pupal chambers from the dead branches of oak, *Quercus wislizenii*, in Marin County, California."

50. *A. labyrinthica* Fall.

"This is generally a species of southern California. I, however, have specimens from Castella, July, 1912, and from Tuolumne County."

51. *A. plagiaticauda* Horn.

Found throughout the Sierras, but rare. One specimen has been seen from Siskiyou County, California, and another from Lake Tahoe. Breeds in manzanita.

52. *A. variegata* Lec.

This Rocky Mountain and Great Basin species courses into California through the gaps in the mountains north of Mt. Shasta. "I have beaten specimens from the branches of dead yellow pine at Carrville, Trinity County, California, during June, 1913. I believe that it breeds in yellow pine."

53. *A. vandykei* Fall.

"Found throughout the northern and middle Sierras. It breeds in *Ceanothus*. I have specimens from McCloud, July,

1914; Sissons, July 5, 1900 (type material); Shasta County and Mariposa County." This species occurs in southern Oregon.

54. *A. mariposa* Horn.

"A species of the middle and southern Sierras. I, however, have specimens from Sonoma County and Lake Tahoe and it no doubt extends farther north."

55. *A. dolorosa* Fall.

"A southern species. I have specimens from Lake and Mariposa Counties, and it probably extends much farther north."

56. *A. hornii* Fall.

"Of this Arizona species I have seen what I consider typical specimens from near Placerville, El Dorado County, July, 1906 as well as from Mt. San Jacinto, in southern California. I have also seen a phase in which the marginal patch of yellow is broken up into large blotches (otherwise not different) from near Placerville, Siskiyou County, and from Tuolumne County."

57. *A. gemina* Horn.

"This species is widely distributed in the State, though nowhere common. It is generally to be found resting on twigs or in flowers, such as those of the wild buckwheat, *Eriogonum*. I have specimens from Mariposa and El Dorado Counties, and have seen them from much farther to the north. There are two fairly distinct phases, the var. *nebulosa* Horn, in which the markings are much broken up, and the typical form, in which the markings are of a lineate type. These phases, however, mate indiscriminately and may be found in the same territory."

58. *Agrilus politus* Say.

Abundant throughout the West. Chiefly found on willow in which it breeds, but also on live oak, the fine twigs of which it often prunes, the larvae girdling the twig within the bark. There is a blue phase (perhaps a distinct species), which seems to be confined to the alder.

59. *A. vittaticollis* Rand.

"One specimen taken by F. W. Nunenmacher in Josephine County, Oregon, May 8, 1910, and two by myself at Carrville, Trinity County, California, July 1, 1913, on willow." Dr. Van Dyke.

60. *A. walsinghami* Cr.

Type locality, Yreka, California. Others have been taken in same region; also in Inyo County, California. It breeds in one of the desert shrubs.

61. *A. nevadensis* Horn.

Western Nevada type locality. There are in the Van Dyke collection specimens from the Yosemite Valley taken on poplar. It may possibly extend farther north.

Notes on some recent studies of Dragonfly Wing Tracheation (Odon.).

By J. G. NEEDHAM, Cornell University, Ithaca, New York.

It was a fortunate day for the progress of our knowledge of the Odonata when R. J. Tillyard began his observations on the dragonflies of Australia. Previously many interesting species had been described from that country, but they were all known merely as museum specimens and known only from bare systematic descriptions drawn mainly by writers in other lands. It is fortunate when the fauna of any land is studied on its own soil; but in the case of Australia it is especially fortunate because of the large number of archaic types there occurring, concerning which a more intimate knowledge has long been desirable.

Such knowledge has been furnished by Tillyard in a large measure; knowledge of life-histories and of habits, of ecology and distribution, of structure and development; and it is being published in a series of fruitful papers of so great value that every Odonatologist must wish that the series may long continue.

Two of these papers¹ deal with wing tracheation, and, like the others, are based on a large first-hand accumulation of facts. Especially valuable is the contribution to the knowledge of the development of the Cordulinae, a subfamily that is represented in Australia by many remarkable forms. But all the groups of the available fauna have been extensively drawn upon.

Tillyard's studies of tracheation extend and entirely corroborate my own² in so far as facts are concerned; but he offers a different interpretation of two matters: (1) the anal veins of the Anisoptera; (2) the radial sector of the Zygoptera. I desire to restate my views concerning these in the light of the new evidence and arguments he has produced.

Tillyard's interpretation of the anal region of the Anisopteran wing differs but little from my own. He found, as I did earlier, that the anal trachea is closely approximated to the cubital for a distance and then descends through an apparent cross vein; then bends again sharply outward and follows thereafter the direct course of the anal vein. He proposes to call the apparent cross vein the "anal crossing," and this I consider an excellent descriptive term and better than "basal cubito-anal cross vein," whether it were originally a cross vein or not; in one instance at least he has shown it is not the most basal of the series of cubital-anal cross veins. Tillyard would call the vein that forms about the conjoined portion of the cubital and anal tracheae Cu+A; and I see no serious objection to this, especially since he then disposes of the vein hitherto known as the anal by a device so little inconvenient as merely labeling it A⁻³. It was not merely the thought

¹Tillyard, R. J. On some problems concerning the development of the wing venation of Odonata. Proc. Linn. Soc. N. S. Wales 39: 163-216, 3 plates, 1914.

Tillyard, R. J. On the development of the wing venation in Zygopterous dragonflies with special reference to the Calopterygidae. Proc. Linn. Soc. N. S. Wales 40: 212-230, 6 text figures, 3 plates, 1915.

²Needham, J. G. A genealogic study of dragonfly wing venation. Proc. U. S. Nat. Mus. 26: 703-764, 14 plates, 44 text figures, 1903.

³In his studies of tracheation of the Chrysopidae (Proc. Linn. Soc. N. S. Wales 41: 221-248, 1916), Tillyard also uses this simple device most opportunely to obviate a cumbersome terminology when apparently simple and direct veins are variously compounded. The condition there pointed out was previously noted by McClendon (Ent. News 17: 120, 1906).

of an encumbered terminology, however, but a doubt as to real homologies of the vein that kept me from doing something like this earlier. I found that the anal trachea originates in the position of the straight adult vein, and only later in development moves up against the cubital, becoming twice angulated. I found the extreme base of the wing saclike and open, its membranes tardily fusing to delimit the vein cavities; and it was easy to conceive that a small marginal trachea, like the anal, occupying a constricted place at the base of the wing might have slipped over where there was obviously more room; and there was and is much doubt in my mind as to whether the vein ever went along with the trachea. This doubt was not resolved by reading Tillyard's paper, for he brings in no new evidence whatever, and I have not his confidence in the constancy of the tracheae. However, Professor Comstock, on reading his paper, set about it and found some new evidence. He reasoned that if the base of the so-called anal vein be a secondary development, some fossil form, if primitive enough, might show its absence. At once he found a single figure of a fossil *Aeschna liassina* of Brodie, which shows this condition. At least the drawing as offered by Brodie⁴ and copied by Handlirsch⁵ shows it. In other parts of the wing, however, this drawing shows obvious inaccuracies. Wherefore, I desired to have the facts confirmed; so I wrote Mr. Herbert Campion to request a re-examination of the specimen. He wrote at once that he thought it was in the Warwick Museum, but on the 13th of May, 1916, he wrote again that it could not be found. Assuming the correctness of this detail of the figure, the best evidence now available seems, therefore, to be in favor of Tillyard's interpretation.

Tillyard's interpretation of the radial sector of the Zygoptera differs utterly and irreconcilably from my own. He found, as I did earlier, that the trachea corresponding to the radial sector is not attached to the radial trachea in any of the Zygoptera, but appears as an added branch of the median tra-

⁴Brodie. Fossil Insects of the secondary rocks of England, Pl. 10, Fig. 4.

⁵Handlirsch. Die fossile Insecten, Pl. 42, Fig. 1.

chea. If this trachea be conceived as a new development from the median stem, I see no particular objection to labeling it Ms; if it be the old original branch from radius that has found a new basal attachment it should still be labeled Rs; but the vein which follows it I cannot believe to be other than Rs of Anisopteran wings. As to the adult vein, I entirely agree with Mr. Campion in the opinion expressed in his letter of March 18th last when he said: "That the Zygoptera do not possess Rs at all is a rather startling proposition and hardly one which can be accepted offhand. In Zygopteran and Anisopteran wings alike we find six longitudinal veins to be all located between R and M. These veins occupy exactly similar positions in the two kinds of wings, and I find it exceedingly difficult to believe that they are to be interpreted in one way in the Zygoptera and in another way in the Anisoptera."

Tillyard demands ontogenetic evidence; and yet, singularly enough, in support of his "unbranched radius theory" he offers just the evidence I lacked to give me the greatest assurance in the other interpretation. This evidence is not from tracheae, however, but from cuticularization of the nymphal wing—a sort of evidence which he himself stresses heavily in support of his theory concerning the development of the anal area of the wing. This cuticularization (anticipatory venation) of the nymphal wing he shows in his text Fig. 5 (Proc. Linn. Soc. N. S. Wales, 40; 227). This shows an actual crossing, for which Dr. Ris' statement that it is "preparatory to the development of the imaginal venation" is no explanation whatever. There is nothing like it in insect wings, except in oblique veins where tracheae either are present or have been present in earlier stages of development. This crossing follows exactly the course taken by the trachea Rs in the more generalized Anisoptera and is probably the channel which that trachea once occupied. It is for me a most satisfactory confirmation of the identity of the vein Rs of the two suborders of Odonata.

Such differences of interpretation grow out of different

ideas as to how the tracheation should be used as an aid to determining the homologies of veins. The tracheation of a nymphal insect wing is never identical with the venation of the adult wing. It may correspond closely; it may entirely diverge. Tracheation affords complete confirmation of vein homologies in some of the lower orders, such as Plecoptera and Corrodentia; it is worthless for such use in other orders, such as Trichoptera and Diptera. It is an aid in most orders, but needs to be used with discretion and with a regard to its limitations. The interpretation of vein homologies by the study of the antecedent tracheae is a method which, like most other methods that we use in zoology, is of value only for what it shows. It is not all-sufficient. Let any one who is inclined to trust to tracheation too far read Miss Morgan's study of Mayfly tracheation^b and learn caution.

The Odonata are not alone in furnishing examples of the replacement of one principal tracheal branch by another, independent of adult venation. In explanation of its occurrence in the Zygoptera in my paper of 1903² (p. 713), I cite the parallel well known case of the attachment of trachea M₁ to the radius in *Picris*, a shift of tracheae which has never led Lepidopterists to change the designation of the adult vein. Indeed Tillyard himself is not consistent; for in the second of the two papers here under consideration he labels and discusses as branches of A, certain tracheae that spring from the cubital stem! If branches of the anal trachea may be shifted without disturbance of the adult vein, why may not those of the radial?

Fortunately, sufficient comparative study will enable one to learn when such shifting have occurred, so that even in specialized groups the testimony of the tracheae is not wholly invalidated. But if we proceed to change the designation of adult veins without first learning this we shall create for ourselves intolerable and unnecessary confusion.

^bMorgan, A. H. Homologies of the wing veins of mayflies. Ann. Entom. Soc. Amer. 5 :89-106, 6 text figures, 5 plates, 1912.

The Egg Laying Habits of a Back-swimmer (Hem.), *Buenoa margaritacea* Bueno, and other biological notes con- cerning it.

By H. B. HUNGERFORD, Cornell University, Ithaca, New York.
(Plate XIII)

After having read in the text-books on entomology that the eggs of back-swimmers are inserted in the stems of aquatic plants, it was a matter of some surprise to the writer when he was informed that such was not the case with those observed in America. In looking up the literature he very shortly discovered that the basis for the statement found in our texts was the fact that *Notonecta glauca*, common in France, was said by Regimbart (1874) to place its eggs in the "twigs and petioles of plants." In a paper entitled "Observations sur la Ponte du Dytiscus marginalis et de Quelques Autres Insectes Aquatiques," among the other aquatic insects he describes briefly the egg-laying habits of *N. glauca* and presents a figure of a stem containing the egg in situ, the cephalic end protruding from the stem.

This article, though not the first to mention the method of oviposition of *Notonecta glauca*, has been widely quoted. An examination of the earlier literature will disclose the fact that the species *N. glauca* must also sometimes glue its eggs to the stems of water plants. The diversity of statements regarding the habits in question is best shown by a review of the Bibliography at end of this paper, wherein are added quotations from some of the various texts from Roesel (1746) to the present time.

In 1896 Kirkaldy exhibited the ova of *Notonecta glauca* var. *urcata* before the Entomological Society of London and, after quoting Regimbart, made the following remarks: "The specimens before you, owing probably to the absence of rushes (*Juncus*) in the vessel, although *Anacharis*, which one would have thought suitable, was in abundance, are entirely external, affixed basally to the stalk by a glutinous substance, as in the allied Corixidae. That this basal fixation is not usual is evident from the fact that the ova are but feebly adherent, drop-

ping off upon a slight disturbance, whereas the ova of the Corixidae are attached exceedingly firmly."

In 1902 Mr. J. R. de la Torre Bueno called attention to the fact that *N. undulata* female does not make a slit in the epidermis of the leaf or stem, but merely glues the eggs along the sides in a rather irregular fashion on the surface. In his paper on "The Genus *Notonecta* in America, North of Mexico, 1905," he states that out of some 1300 or 1400 ova of four or five species observed, in all but one instance* were the eggs attached to submerged plants or twigs.

Christine Essenberg (1915), in her studies on the habits and natural history of the back-swimmers, reports that the four species with which she worked at Berkeley, California, namely, *Notonecta undulata* var. *charon*, *N. insulata*, Kirby, *N. indica* and an undescribed species, all attach their eggs to the stems of plants, as noted by Mr. Torre Bueno, and even to the backs of other insects, such as dragon fly nymphs. It would seem probable then that in the case of all of our American species of this genus, the eggs as a rule are attached to the surface of their support.

Thus a diversity in habits of oviposition between the common European form, as reported by Regimbart, and our own species has been a matter of some interest, and it may add a trifle to our appreciation of the American back-swimmers to note that among them in the genus *Buenoa* is one which, with more parental concern than is evinced by even the European *glauca*, embeds its ova in the stems of water plants.

At this point it may be well to recall that there are three genera of the family *Notonectidae* in America north of Mexico. They are *Notonecta*, *Buenoa* and *Plea*, which are represented by 12, 3 and 1 species, respectively. These may be separated by the following table, wherein is included a key to the species of the genus *Buenoa*.†

- | | |
|---|--------------------|
| A. Legs all similar | <i>Plea</i> Leach. |
| A.A. Legs dissimilar, hind legs flattened and fringed for swimming. | |

*This one instance was a case of *N. undulata* female which placed her ova quite deeply in the stem of a water weed.

†Adapted from Bueno (1905) and (1909) and earlier workers.

- B. Last joint of antennae much shorter than penultimate,
Notonecta Linn.
- B.B. Last joint of antennae longer than the penultimate.
Buenoa Kirk.
- C. Large species over 6 mm. long.....*B. margaritacea* Bueno
- C.C. Smaller species less than 6 mm. long.
- D. Eyes large and prominent; shape slender.
B. platycnemis Fieb.
- D.D. Eyes large but not prominent—shape more convex,
B. elegans. Fieb.

Of these three genera it has long been known that the tiny *Plea* places its eggs out of harm's way in the stems of the aquatic plants. The observations have been for the European *P. minutissima* Leach, but the same is doubtless true in the case of our own *Plea striola*, for the female possesses the necessary equipment for such a task.

All American members of the genus *Notonecta*, at least those that have been observed, attach their eggs by their long axis to stems of plants, submerged brush wood and the like. The egg of *N. undulata*, our commonest species, is shown in Fig. 7, Pl. XIII.

It is a pleasure to report some observations on the oviposition of the female of one species of the genus *Buenoa*, which is endophytic in this habit.

After futile attempts to obtain the eggs in the aquarium which, it was supposed, would be deposited on the twigs placed therein for the purpose, an examination of the female's equipment for oviposition disclosed the device shown in Plate XIII, Fig 9.

With this clue, the pond was visited at once and quite fortunately the first object examined was literally full of the same sort of ova which had been noted in the bodies of the bugs. It was an uprooted smartweed (*Polygonum*) floating in the pool some fifteen feet from shore. Not only were the stems of this green bit of smartweed swollen and distorted* by the many eggs it contained, but the leaves also were em-

* Stem of smartweed 23 ova crowded in linear space of one centimeter.

ployed as *nidi* with varying degrees of success. The leaves were punctured and the egg, when present, rested suspended beneath, attached by the collar shown in the drawing Pl. XIII, Fig. 1, to the upper surface margins of the incision. The many perforations or slits through the leaves gave their testimony to the many failures in attempting to employ so thin a structure for nidification.

Subsequently eggs have been found in floating *Typha* and *Juncus* and have been deposited in the aquarium in the tissues of both of these plants.

The drawings give perhaps a better idea of the eggs and young larvae than a description, but the following are submitted for the purpose of their precise recognition.

THE OVUM.

Size: 1.125 mm. long by .406 mm. in its widest diameter. The size increases somewhat with the development of the embryo within, which causes a bulging of the stem in which the egg is inserted.

Shape. The egg is an elongate oval when seen in surface view with the cephalic end the more pointed. (Surface view = the side, a portion of which is exposed to view as the egg lies imbedded in the stem.) In lateral view it appears nearly straight in the outline of its upper surface while the lower is quite strongly curved.

Color. Pearly white when first laid—the surface hexagonally reticulate as in the eggs of *Notonecta*. A smooth and shiny elongate oval area occupies the anterior half of the upper surface. This is the portion exposed and is margined by a whitish band which marks the union of the egg with the surface of the stem when *in situ*. As the embryo develops, the entire egg becomes deep greyish yellow and the red eye spots and other red markings show through the chorion. The part exposed becomes dark amber in color and very shiny in appearance. The surface appears reticulate under magnification.

FIRST INSTAR NYMPH.

Size (in millimeters): body length 1.85, body width .625; head width .5, distance between eyes .156. Fore limb: femur .25, tibia .35, tarsus .25 mm. Middle limb .387, .333 and .275 and hind limb .625, .630 and .625 for femur, tibia and tarsus respectively.

Color. Ventral aspect: White—the abdominal fringe of hairs, the ventral abdominal tuft, the hair tufts before the hind coxae and those of middle coxae—black. The hairs fringing the hind tarsi are smoky black as are the middle and fore tibia. Eyes dark red. No indication

of the red pigment in the abdomen so conspicuous in older nymphs and adults. White with the red eyes—the only conspicuous marking.

Structural details: The absence of the median abdominal carina from the venter, as is the case also with *N. undulata* nymphs, is the first and most striking peculiarity. The interspace between the eyes is large. Beak four-jointed as in adult. Tarsi all one-jointed, terminating in two claws. The spiny armature of fore legs is more generalized than in later forms. The fringe of the hind legs confined to the margins of the tarsi.

THE OLDER NYMPHS.

In order that space may be conserved, a table of measurements for the various instars is presented below and a discussion of the changes in structure as development proceeds appended.

MEASUREMENTS IN MILLIMETERS OF NYMPHS OF *B. margaritacea*.

Instar	BODY MEASUREMENTS			LEG MEASUREMENTS								
	Length	Width	Width head	FORE LEG			MIDDLE LEG			HIND LEG		
				Femur	Tibia	Tarsi	Femur	Tibia	Tarsi	Femur	Tibia	Tarsi
1st	1.35	.625	.5	.25	.35	.25	.887	.833	.275	.625	.68	.625
2nd	2.25	.702	.625	.375	.438	.313	.5	.438	.375	.75	.76	.81
3rd	3.225	.938	.832	.5	.62	.487	.75	.625	.6	1.1	1.1	.975
4th	4.5	1.625	1.063	.625	.75	.563	1.063	.875	.725	1.625	1.875	1.28
5th	5.75	2.3	1.365	.8	1.2	.81	1.5	.625	1.125	2.25	1.85	1.6
6 ♂	7.*	2.2	1.62	1.	1.35	1.	1.75	1.87	1.25	2.5	2.35	1.95
6 ♀	7.5	2.9	1.75	1.	1.5	1.	2.	1.5	1.3	3.	2.62	2.3

The adults of this species are separated in the synoptic table from the other two species on the basis of the body length, which is greater than 6 mm. This, with a diagnosis of the instars from structural characters, may serve to separate the nymphs of this species from those of the others. The table of measurements above is based on an average of ten specimens of each instar. A larger number would be desirable to obtain figures dealing with ratio of growth. The writer believes that an examination of a sufficiently large amount of material would show for head-widths and limb measurements a ratio of 1:1.25. That is to say, the width of the head of the

* Bueno gives length of species 6.7-8.1, lat. 2.28 mm.

second instar nymph would be approximately 1.25 times that of the first instar nymph.

Upon attaining the adult stage a sexual dimorphism becomes apparent. Besides the structural differences of the genitalia, the anterior legs of the male possess on the inner faces of the femora and tibia peculiar stridular areas.

The tibial structure is borne on the inner face of a prominence, which is formed by the elevation of the inner angle or margin of the tibia near its base into a thin but elongate spur. This spur is lacking in the female and not discovered in the nymphs. (See pl. XIII, Figs. 5 and 6.)

THE DEVELOPMENTAL CHANGES.

Head. The notocephalic margins of the eyes which are near together and nearly parallel in the adult are relatively much farther apart in the first instar nymph. In the newly hatched bug, the distance at synthlipsis is nearly 1-3 (one-third) width of head with the margins of the eyes diverging broadly to the vertex. As the development proceeds from instar to instar the eyes are brought nearer and nearer to their relations in the adult where the synthlipsis is reduced to about 7.14% of the width of the head.

The beak is four-segmented and the antennae of the nymphs have much the form of those in the adults.

Legs. The general form as in the adult. The tarsi of all the legs one-segmented and terminated by two claws. (The tarsi of the adults are two-segmented and end in two claws.)

Wings. The wing-pads are very inconspicuous even in the later nymphal instars. By the *third instar* the pads appear on the antero-ventral margins of the mesothorax as little flaps, the distal ends of which reach a position on a line with the trochanter of the fore leg when flexed. In the *fourth instar* they are much larger, the apices attaining to a position on a line with the distal end of the mesothoracic tibiae when the limb is flexed. In the *fifth instar* they are still closely applied to the side of the thorax, but the tips of the more opaque pads reach a point on a line with the distal ends of the hind coxae.

HABITS OF THE SPECIES.

Buenoa margaritacea is the common representative of its genus in the ponds and pools of eastern Kansas. It appears to prefer the open water and is in much better equilibrium in its watery world than the *Notonectae*.

Individuals of this species may be seen in large numbers

swimming slowly or even poising in mid-water some distance beneath the surface. They abound in waters teeming with *Entomostraca*, upon which they largely feed, the crib formed by the closure of the anterior two spiny pairs of legs being nicely adapted to the retention of such prey. Their dexterity in the manipulation of this device and its efficiency in retaining small beings may be demonstrated quite readily under the binocular, and affords another of nature's illustrations of the fitness of form to function.

Like others of the predatory class of water bugs they do on occasion fall upon corixids and other forms than the entomostraca, but not with the regularity of many of the others.

Adults appear from early spring to late fall. The eggs may be found in May, the nymphs begin to emerge by the middle of the month and by the 15th of June form a dominant species to be noted in all stages of development from egg to adult in waters suitable to their needs.

They are wilder and more difficult creatures to rear than the *Notonectae*, but no less interesting objects of study. So far as the writer is aware there has been nothing noted hitherto concerning their biology and he is glad to record for them something of the economy of their lives.

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EXPLANATION OF PLATE XIII.

All the figures refer to *Buenoa margaritacea* unless otherwise stated.

Fig. 1. Egg removed from the stem showing the clear exposed area of the egg and its margin of white.

Fig. 2. Eggs in situ in stem of *Juncus*.

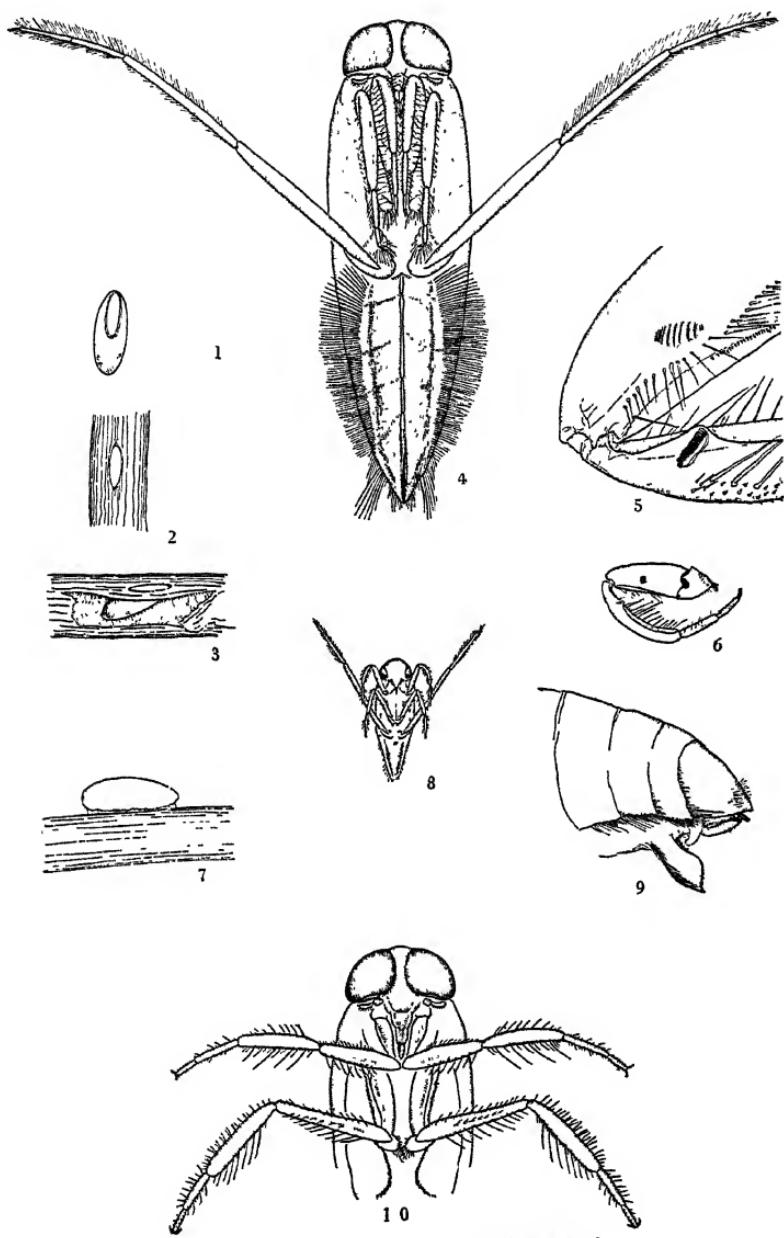
Fig. 3. A portion of the stem of *Juncus* removed to show the egg in situ.

Fig. 4. Ventral view of the female showing the appearance of the ovipositor and the crib formed by the two anterior pairs of legs for the retention of entomostracans. Compare with figure 10.

Fig. 5. Inner view of the stridular areas on the femur and tibia of the anterior leg of the male, greatly enlarged from figure 6.

Fig. 6. Inner view of the anterior leg of male showing the tibial prominence and stridular areas.

Fig. 7. Eggs of *Notonecta undulata* glued to the stem of aquatic plant. Drawn from a photograph.

*HB Hungerford del.*

BUENOA MARGARITACEA—HUNGERFORD.

Fig. 8. Newly hatched *B. margaritacea*. Note distance between the eyes, the absence of ventral abdominal plate and the fact that the tarsi are one-segmented.

Fig. 9. Lateral view of the terminal segments of the female showing the ventral plate drawn to expose the strongly dentated and chitinized ovipositor, by means of which incisions are made for the reception of the eggs in the tissues of plants.

Fig. 10. Compare with figure 4. The anterior legs spread to show the concavities of the limbs and their spiny armature.

A New Species of *Acronycta* (Lep.).

By OTTO BUCHHOLZ, Elizabeth, New Jersey.

Acronycta wanda n. sp.

Ground color a uniform, very dark smoky grey. Head blackish above. Thorax without markings save the usual black line from the palpi to the base of the wings.

Primaries with all the markings fairly well defined. Basal line geminate, extending to basal dash. Transverse anterior line geminate, outwardly oblique, the inner line a little more strongly defined than the outer, especially from costa to basal dash. A very feeble median shade runs obliquely from costa to reniform. The transverse posterior line is geminate, the inner line very faint, the outer line black, lunulate, the intervening space paler than the ground color. A diffusely lunulate, interrupted whitish subterminal line. A dusky terminal line with larger interspacial dots, beyond which is a dusky interline in the fringes; the latter are whitish and cut with black. In fresh specimens the dots of the terminal line extend as fine black lines to the subterminal line. The basal streak, which in some specimens is bordered with white above, is heavy and extends to the outer portion of transverse anterior line and sometimes a little beyond. A fine dagger mark opposite the cell runs a trifle beyond the t. p. line. A similar mark in the submedian interspace also crosses the t. p. line and is much heavier than the other. All veins are marked blackish on outer half of wing. The orbicular is small, concolorous, black-edged, irregular and usually complete. Reniform kidney-shaped, moderate in size and sometimes darkened inferiorly. The two spots are connected by a black line.

Secondaries smoky in both sexes. Beneath whitish, primaries a little darker than secondaries, with the usual outer line and discal spots.

Expanse, 1.65-1.90 inches (42-48 mm.)

Habitat Union County, New Jersey, beginning of June and August. Four males and one female have been under examination. This species belongs in the *lobeliae* group and suggests *furcifera* in structure and ornamentation, but it is much darker, almost black, and the prominent marked veins serve to separate the two. In recognition of the persistent work in this group done by my wife, I dedicate this species to her. Type a male in the author's collection. A male co-type in the collection of F. Lemmer, Irvington, New Jersey.

The New Head of the Department of Zoology and Entomology, Ohio State University.

Professor Raymond C. Osburn, of the Connecticut College, New London, Connecticut, has been elected Head of the Department of Zoology and Entomology of the Ohio State University, his appointment to take effect July 1st. He will assume the duties carried during the last nineteen years by Dr. Herbert Osborn, who was last year elected Research Professor and who will hereafter give his entire time to research work, including a direction of research work by graduate students, and, for the present, the Directorship of the Lake Laboratory and of the Ohio Biological Survey.

Dr. R. C. Osburn graduated from the Ohio State University in 1898, received a Master's degree from the same institution in 1900, and the Ph.D. degree from Columbia in 1906. He has been connected as a teacher with the Starling Medical College, Columbus, Ohio; Fargo College, Fargo, North Dakota; Clinton High School of Commerce, New York City; Barnard College, Columbia University, and the Connecticut College, in which he is now Professor of Biology.

Dr. Osburn is known to entomologists as the author of a number of papers on Syrphidae and Odonata and he was for several years President of the New York Entomological Society. He is much interested in the ecology of aquatic insects, but his main work has been upon aquatic invertebrates and fishes.

Adult Chrysopidae Do Eat (Neur.).

I was very much interested in the Notes on the Feeding Habits of Adult Chrysopidae, by L. Bradford Ripley, in the January, 1917, number of Entomological News.

By actual observation I can indorse Prof. Ripley's statement that Chrysopidae take food in the adult stage. While my observation was of short duration and of a single specimen, it proved beyond a doubt that these insects are far from being abstinent. On the evening of September 19th, 1916, an adult Lace-winged fly was captured and the next morning, having just finished eating a juicy pear, I had occasion to examine this specimen which was in a stupid condition, as I now believe for the want of food.

No sooner had I taken it into my hand than it began to gnaw at my fingers, which were yet moist with the juice of the pear. Taking a tip from this, I sprinkled some granulated sugar on my hand which it ravenously ate.

Through a hand-glass we saw grain after grain quickly disappear, and this little creature did not content itself to feed among the scattering grains, but waded into the thick of the sugar. This specimen was placed back in the jar with some sugar and water where it remained until the next morning when I took it from the jar to feed it some more pear juice.

When placing it on my hand, as I had the day before, I found to my disappointment that I did not have the little pet that I thought I had, for it briskly flew away, showing that the gentleness of the day before was caused by hunger. After finding that these insects feed on sugar and fruit juice I have but little doubt about their feeding on the natural sweets of flowers and plants.—WILTON T. GOE, Portland, Oregon.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., APRIL, 1917.

Ants vs. Men.

The President's address before the Geological Society of America at Albany, December 28, 1916, printed in *Science* for February 9, 1917, contains some remarks interesting to the entomologist which the latter would hardly look for in a discourse entitled "The Philosophy of Geology and the Order of the State." The speaker, distinguished and honored for his many contributions to his science, "wish[es] to nail [certain theses] on the doors of our temple" of geology. Among them are

Nature makes for the individual . . . In the progressive line of development which in the present terminates in us, the procedure of nature has been one of only limited concern for the family and of tried out and abandoned experiment for social partnerships and the division of labor.

A lively account of the "six-legged articulate expression of existence" which "has led to most extraordinary displays of morphological and psychic differentiation," culminating in the ants, "nature's great triumph, her highest performance in communistic effort and in co-operative achievement," is brought to the astonishing conclusion that . . .

The six-legged type with all its purposes, in its highest expression lies prostrate on the ground at our feet, it and its achievements have risen to nothing higher than an ant hill, its communistic relations and subservience are entirely apart from the true genius of humanity . . . For the former the student of nature's history sees no outcome.

We say astonishing, for, while we are well aware that the anthropocentric conception of the universe still permeates the

great mass of humanity, we thought that scientific men at least were able to throw off the egotism of their own species and look at nature from a detached standpoint. We can as little foresee that there will be no outcome for the ants as Cuvier was able to foresee the downfall of his law of correlation of parts. With the human species at the present time engaged in an almost universal attempt to destroy itself, it is farcical to talk of its "active, progressive and fertile individualism," while the success of Argentine, leaf-cutting and other ants throughout the world, despite human objections, gives one a sufficient basis for expecting as long a continuance of these pertinacious insects on the earth as of the, one would like to say, satirically named *Homo sapiens*.

◆◆◆

The Host of *Ablerus clisiocampae* Ash. (Hym.).*

The following note is in corroboration of the observations made upon the host of *Ablerus clisiocampae* Ash. by L. T. Williams. (*Psyche*, October, 1916.)

In the spring of 1915, the writer bred several specimens of *Ablerus clisiocampae* from the eggs of *Malacosoma americana* Fab., but at the time was unable to make sure that the parasite had not emerged from a scale insect, although it hardly seemed possible. In the spring of 1916, after a few specimens of *Ablerus* had appeared, a number of egg masses were taken from the twigs, and thoroughly examined for the presence of scale insects, but none were present. With all possible chance of the presence of scale insects thus eliminated, the parasites continued to emerge from the egg masses in fair numbers. A repetition of the experiment gave the same result.

These observations corroborate those made by Williams and the original ones made by Ashmead, that this species, contrary to the habits of the family to which it belongs, does at least at times parasitize the eggs of a Lepidopterous insect.

In addition to *Ablerus clisiocampae*, three other species of parasites were bred from the egg masses. They were kindly determined for me by Mr. A. A. Girault as *Telenomus coloradensis* Crawford, *Tetrastichus malacosomae* Girault, and *Ooencyrtus* sp. Of these, *Tetrastichus malacosomae* was by far the most abundant, the other two species being only occasionally found.—B. A. PORTER, Amherst, Massachusetts.

*Contribution from the Entomological Laboratory, Massachusetts Agricultural College.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded.

The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new species are all grouped at the end of each Order of which they treat. Unless mentioned in the title, the number of the new species occurring north of Mexico is given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

- 1—Proceedings, Academy of Natural Sciences of Philadelphia.
2—Transactions, American Entomological Society, Philadelphia.
4—The Canadian Entomologist. 10—Nature, London. 37—Le Naturaliste Canadien, Quebec. 50—Proceedings, U. S. National Museum.
68—Science, New York. 42—Journal, Linnean Society (Zoology), London. 87—Bulletin, Societe Entomologique de France, Paris.
143—Ohio Journal of Science, Columbus, Ohio. 153—Bulletin, American Museum of Natural History, New York 161—Proceedings, Biological Society of Washington. 184—Journal of Experimental Zoology, Philadelphia. 198—Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. 223—Broteria, Revista de Ciencias Naturaes do Collegio de S. Fiel. (Ser Zoologica).
235—Memoire, R. Accademia dei Lincei, 5th series, Roma. 237—University of Colorado Studies, Boulder. 240—Maine Agricultural Experiment Station, Orono. 283—Bulletin, Societe Zoologique de France, Paris. 284—Bulletin, Museum National d'Histoire Naturelle, Reunion Mensuelle des Naturalistes du Museum, Paris. 307—Annales, Societe Linneene de Lyon (n. ser.). 324—Journal of Animal Behavior, Cambridge. 379—Proceedings of the International Zoological Congress. 480—The Annals of Applied Biology.
490—The Journal of Parasitology, Urbana, Illinois. 509—Revue Generale des Sciences Pures et Appliquees, Paris. 532—Proceedings, National Academy of Sciences of the United States of America, Washington. 538—Lorquinia, Los Angeles. 546—Illinois Biological Monographs, Urbana. 547—Journal, The Franklin Institute, Philadelphia. 548—Physis, Revista de la Sociedad Argentina de Ciencias Naturales.

GENERAL SUBJECT. Cockerell, T. D. A.—The fauna of Boulder Co., Colorado, III-IV. Diptera, etc., 237, xvii, 5-25. Dahlgren, U.—The production of light by animals, 547, 1917, 323-48. Falcoz, L.—Contribution a l'étude de la faune des microcavernes faune des

terriers et des nids, 307, lxi, 59-246. Jorgensen, P.—Zoocecidios argentinos, 548, ii, 350-65. Labitte, A.—Longevite de quelques insectes en captivite, 284, 1916, 105-13. Navas, R. P. L.—Particularidades sobre las alas de los insectos, 379, ix, 767-73. Neveu-Lemaire—Parasitologie des plantes agricoles [Paris, J. Lamarre, 1913], 720 pp. Reed, E. B.—Obituary notice, 4, 1917, 37-9. Stiles, C. W.—Report of the international commission on zoological nomenclature, 379, ix, 852-915. Tavares, J. S.—As cecidas do Brazil que se criam nas plantas da familia das Melastomataceae, 223, xv, 18-49.

PHYSIOLOGY AND EMBRYOLOGY. C. G. H.—Sex-limited factors in heredity, 10, xcix, 479-80. Foa, A.—Studio sul polimorfismo unisessuale del Rhizoglyphus echinopus corredata da osservazioni biologiche..., 235, xii, fas. 1, 109 pp. Goldschmidt, R.—On a case of facultative parthenogenesis in the gypsy-moth, with a discussion of the relation of parthenogenesis to sex, 198, xxxii, 35-43. Marshall & Muller—The effect of long-continued heterozygosis on a variable character in *Drosophila*, 184, xxii, 457-70. Plough, H. H.—Cytoplasmic structures in the male germ cells of *Rhomaleum micropterum*, 198, xxxii, 1-12.

ARACHNIDA, ETC. Macnamara, C.—On the portrait of a wolf spider, 4, 1917, 39-45. Wheeler, W. M.—The synchronic behavior of Phalangidae, 68, xlvi, 189-90.

Ewing, H. E.—New Acarina, Part II. Descriptions of n. sps. and var. from Iowa, Missouri, Illinois, Indiana and Ohio [28 new], 153, xxxvii, 149-72. Weidman, F. D.—*Cytoleichus penrosei*, a new arachnid parasite found in the diseased lungs of a prairie dog, 490, iii, 82-9.

NEUROPTERA, ETC. Tillyard, R. J.—A study of the rectal breathing apparatus in the larvae of Anisopterid dragonflies, 42, xxxiii, 127-96.

ORTHOPTERA. Foucher, G.—Etudes biologiques sur le Cyphocrania gigas d'Amboine, 509, xxvii, 706-13. Serre, P.—L'Ile de la Trinite menacée d'une invasion de Sauterelles, 284, 1916, 101-4.

Hebard, M.—Studies in the group Ischnopterites (Blattidae) [8 n. sps.], 2, xlvi, 337-86.

HEMIPTERA. Deletang, L.—Notas hemipterologicas, 548, ii, 263-71. Gibson, E. H.—Additions to the list of Missouri Cicadellidae, 4, 1917, 75-6. Lizer, C.—Sobre la presencia del Chrysomphalus paulistus, en el Delta del Paraná; Ceroplastes grandis, nuevo para la fauna argentina, 548, iii, 432, 438. Osborn, H.—Studies of life histories of frog-hoppers of Maine, 240, Bul. 254. Parshley, H. M.—Insects in ocean drift, 4, 1917, 45-48.

Drake, C. J.—A survey of the No. American species of *Merragata* [2 new], 143, xvii, 101-5. **Lathrop, F. H.**—A preliminary list of Cicadellidae of So. Carolina, with descriptions of n. sps. [7 new], 143, xvii, 119-131. **Shinji, C. O.**—The California species of *Myzus* with description of a n. sp.; A n. sp. of *Amphrophora* from California, 4, 1917, 49-51; 51-2.

LEPIDOPTERA. **Fox, C. L.**—A few notes on a collecting trip around Palm Springs, Riverside Co., California, 538, i, 49-51. **Giacomelli, E.**—Sobre una nueva aberración de *Cyanohipsa stefanellii*, A proposito de una Pierida del genero *Hesperocharis*, 548, ii, 293-295. **d'Herculais, J. K.**—Les sphingides du genre *Acherontia*, Lepidopteres mellivores parasites des abeilles, 284, 1916, 17-49. **Mabille et Bouillet**—Description d'*Hesperides* nouveaux, 87, 1916, 320-5. **Pictet, A.**—Le rôle joué par la sélection naturelle dans l'hibernation des lepidoptères, 379, ix, 774-88.

Swett, L. W.—Geometrid notes: The genus *Dysstroma* [3 new], 4, 1917, 64-72.

DIPTERA. **Baumberger, J. P.**—The food of *Drosophila melanogaster*, 532, iii, 122-6. **Cole, W. H.**—The reactions of *Drosophila ampelophila* to gravity, centrifugation, and air currents, 324, vii, 71-80. **Peterson, A.**—The head-capsule and mouth-parts of *D.*, 546, iii, No. 2, 112 pp. **Rennie, J.**—On the biology and economic significance of *Tipula paludosa*, 480, iii, 116-37. **Szilady, Z.**—Vorläufige mitteilung ueber eine Tabaniden-monographie, 379, ix, 744-5.

Alexander, C. P.—New or little-known crane-flies from the U. S. and Canada: Tipulidae, Ptychopteridae, Pt. 3 [many new], 1, 1916, 486-549. **Cockerell, T. D. A.**—A fossil tsetse fly and other diptera from Florissant, Colorado, 161, xxx, 19-23. **Cresson, E. T., Jr.**—A revision of the species of the genera *Notiphila* and *Dichaeta* (Ephydriidae) [13 n. sps.], 2, xlili, 27-66. **Johannsen, O. A.**—New eastern Anthomyiidae [8 new], 2, xlili, 385-98.

COLEOPTERA. **Brethes, J.**—Sobre la variabilidad de algunos Crisomelidos: cosa de "Chalcophana lineata"; Description d'un nouveau genre et d'une nouvelle espece de Staphylinidae myrmecophile; Descripcion de un nuevo Carabido de la R. Argentina, 548, iii, 424; 431-2; 464-5. **Bruch, C.**—Descripcion de un nuevo Tenebrioideo del Chubut *Calymnophorus patagonicus*, 548, ii, 292-3. **Miscelaneas coleopterologicas**, 548, iii, 456-61. **Ford, G. H.**—Observations on the larval and pupal stages of *Agriotes obscurus*, 480, iii, 97-115. **Frers, A. G.**—Variabilidad en la coloracion de un Crisomelido de la provincia Buenos Aires, *Lema orbignyi*, 548, iii, 433-5. **Gallardo, A.**—El mirmecofilo sinfilo *Fustiger elegans*, 548, ii, 254-7. **Germain, F.**—Histerides d'Ottawa et des environs, 37, xlili, 125-8 (cont.). **Houlbert, C.**—La loi de la taille et l'évolution des coleop-

teres, 379, ix, 699-742. **Leng & Mutchler**—Supplement to preliminary list of the C. of the West Indies, 153, xxxvii, 191-290. **Lesne, P.**—Notes sur les coleopteres terediles. Variabilite de certains Lyctides de l'Amerique du Nord, 284, 1916, 92-100. **McDermott, F. A.**—Observations on the light emission of American Lampyridae, 4, 1917, 53-61. **Pic, M.**—Nouveaux malacodermes exotiques, 283, xl, 95-7. **Xambeu, C.**—Moeurs et metamorphoses des insectes, 16 memoire, 307, lxii, 25-42.

Blanchard, F.—Revision of the Throscidae of No. America [7 n. sp.], 2, xliii, 1-26. **Fall, H. C.**—Short studies in the Malachiidae [24 n. sps.], 2, xliii, 67-88.

HYMENOPTERA. **Brethes, J.**—Un caso anormal en "Polistes canadensis" var. "Ferreri"; Le genre "Xylocopa" dans la Republique Argentine, 548, iii, 423; 407-21. **Carpenter, G. H.**—The scarcity of wasps, 10, xcix, 413. **Kojewnikov, G.**—Sur les abeilles hermaphrodites, 379, ix, 743. **Santschi, F.**—Formicides sudamericains nouveaux ou peu connus, 548, iii, 365-99. **Stoehr, L. M.**—"Microbembex monodonta," 37, xliii, 113-19 (cont.). **Wheeler, W. M.**—The phylogenetic development of subapterous and apterous castes in the Formicidae, 532, iii, 109-17.

Brues, C. T.—Adult hymenopterous parasites attached to the body of their host [1 new sp.], 532, iii, 136-40. **Mickel, C. E.**—New sps. of H. of the superfamily Sphecoidea [many new], 2, xlvi, 399-434. **Parker, J. B.**—A revision of the bembicine wasps of America, north of Mexico [some new], 50, iii, 1-555.

CHECK LIST OF LEPIDOPTERA OF BOREAL AMERICA. By WM. BARNES, S.B., M.D., and J. McDUNNOUGH, PH.D. Decatur, Illinois, February, 1917. Published under the patronage of Miss Jessie D. Gillett, Elkhart, Indiana.

It has been thirteen years since we have had a list of North American Lepidoptera and, as the authors say, many new species have been described and revisions made in many groups and also changes in classification. Such a list is always useful, as far as it goes, and the present one has brought the Lepidoptera up to the present state of our knowledge. Six hundred and sixty-one species of Rhopalocera are listed as compared with six hundred and ninety-eight listed by J. B. Smith in 1903. This difference is due to some of them being reduced to the synonymy and others being considered varieties or aberrations. The genera used are more in harmony with common sense than as hitherto used by some persons, but of course there is much to be done to place them on a firm foundation. Eight thousand

four hundred and ninety-five species of moths are listed, whereas Smith's list went to seven thousand, one hundred and sixty-nine, an increase of one thousand, three hundred and twenty-six. This is a very considerable increase, and while there will be still more species of moths described, there will also be a considerable reduction by synonymy, varieties and aberrations, as the genera are revised and the relationships of the species better known. It goes without saying that other students will not agree in all cases with the authors in regard to the standing of the species, but that is to be expected, as such a work always shows a certain amount of personal opinion. Taking it as a whole the authors have been conservative. The complete index is valuable. We find nothing to condemn and much to praise, and trust that those persons for whom the work has been prepared will be duly appreciative.—H. S.

Doings of Societies.

Feldman Collecting Social.

Meeting of December 20th, 1916, at the home of H. W. Wenzel, 5614 Stewart Street, Philadelphia; twelve members present. President H. A. Wenzel in the chair. Prof. J. G. Sanders, State Zoologist of Pennsylvania, elected an honorary member.

Lepidoptera. Mr. Daecke mentioned that a Mr. Anderson had found larvae of *Vanessa antiopa* Linn. on willow along the Susquehanna River, at Harrisburg, Pennsylvania, from which was reared one, on September 1st, that has a yellow band covering the outer half of wings; this was exhibited and is var. *hygiaeae* Heg.; he stated that the only record he knew of this "freak" is in Holland's *Butterfly Book*, p. 169, pl. xx, fig. 4, 1910.

Coleoptera. Mr. H. W. Wenzel exhibited his rearranged collection of Colydiidae and Cucujidae. Dr. Castle exhibited two specimens of *Pelcynus obscurus* LeC. from Detroit, Florida, October 15; a species with very peculiar antennæ; he also has it from Savannah, Georgia. Mr. Wenzel said all his specimens are from Texas. Dr. C. also reported breeding *Callidium antennatum* Newm. from the larvae in logs brought to the meeting of September 20th by Mr. Hoyer. Mr. Laurent, quoting from an article published in *Science* of November 17th, 1916, entitled "The Synchronous or Simultaneous Flashing of Fireflies," stated that he did not believe any such occurrence ever took place, that it was nothing but the twitching of the observer's eyelids. Some years ago he saw what he thought to be a case of simultaneous flashing of fireflies (Lampyridæ); however, he soon discovered it was nothing but the twitching of his eyelids that caused the effect and the insects had nothing whatever to do with it. Adjourned to the annex.

GEO. M. GREENE, Secretary.

Entomological Section, The Academy of Natural Sciences, Philadelphia.

Meeting of January 25, 1917. Eleven persons present. Director Philip Laurent presiding.

Dr. Calvert exhibited specimens of some of the more striking insects which Mrs. Calvert and he had collected in Costa Rica and which they had arranged for reproduction as a colored plate in their book on Costa Rica soon to appear. He also exhibited plates showing the progressive steps necessary to produce the finished four-color plate. He also spoke of some of the peculiarities of these insects and why they chose them for their illustration.

A demonstration was made of a new stereopticon purchased by the Section.

Orthoptera.—Mr. Hebard exhibited a few specimens of earwigs showing extremes in size, the largest being 37 mm. and the smallest being 2.5 mm. in length. He also spoke about some of the interesting species of this family of insects.—E. T. CRESSON, JR., *Recorder*.

Entomological Workers of Ohio.

The Third Annual Meeting of Entomological Workers of Ohio was held at the Ohio State University on February 2nd, 1917, with thirty members in attendance. The program consisted of reviews of projects and reports on investigations of members of the Ohio Experiment Station, the State Division of Orchard and Nursery Inspection and the Department of Entomology of the University.

The following program was presented:

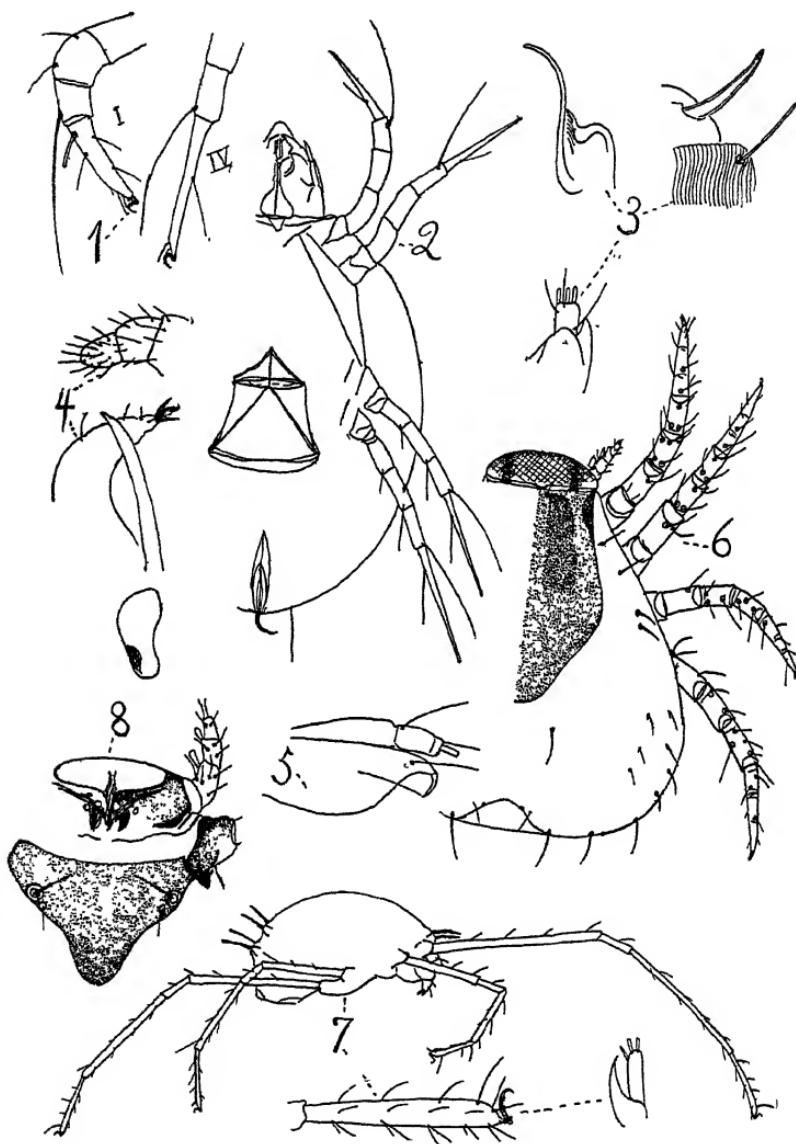
Distribution of Ohio Broods of the Periodical Cicada with reference to Soil, H. A. Gossard.

General Reports from Heads of Department Organizations:

H. A. Gossard, Ohio Experiment Station; N. E. Shaw, State Division of Orchard and Nursery Inspection; Herbert Osborn, Department of Zoology and Entomology, Ohio State University. H. A. Gossard, J. S. Houser, W. H. Goodwin, R. D. Whitmarsh, D. C. Mote and J. L. King, Reviews of Projects; Richard Faxon, Nursery Imports; F. D. Heckathorn, Winter Work in Nurseries and Surroundings; H. E. Evans, An Inspector's Itinerary for a Year; H. J. Speaker, Report of Control of Gypsy Moth Outbreak; C. L. Metcalf, Predaceous Insects; C. J. Drake, Notes on Aquatic and Semi-aquatic Hemiptera of Ohio; Herbert Osborn, Problems with Meadow Insects; T. L. Guyton, Aphidae of Ohio.

A permanent organization was effected and the following officers were elected for 1917-18: N. E. Shaw, *Chairman*; J. S. Houser, *Secretary*.

C. L. METCALF, *Sec'y.*



NEW MITES—BANKS.

- | | |
|-------------------------------------|-------------------------------------|
| 1. <i>TYROGLYPHUS SACCHARI.</i> | 5. <i>TETRANYCHUS ANTILLARUM.</i> |
| 2. <i>CHORTOGLYPHUS GRACILIPES.</i> | 6, 8. <i>SPELAEORHYNCHUS LATUS.</i> |
| 3. <i>TETRANOBIA DECEPTA.</i> | 7. <i>TETRANYCHINA APICALIS.</i> |
| 4. <i>NOTOPHALLUS VIRIDIS</i> | |

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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New Mites, mostly Economic (Arach., Acar.).

By NATHAN BANKS.

(Plates XIV, XV).

The following new species are part of the great amount of material sent to the United States Bureau of Entomology for determination. The species of definite economic value I have described, and also a few that represent peculiar genera, new to the collections. A new arrangement of the genera of red spiders is also proposed, including three new genera.

EUPODIDAE.

Notophallus viridis n. sp. (Pl. XIV, fig. 4; Pl. XV, fig. 14).

Dark greenish, legs reddish, a red spot on dorsum near tip, and one on venter also near tip; mouth parts red. Body about one and one-third times longer than broad, almost globose, high and broadly rounded behind, above with scattered, fine, short, simple hairs. Legs slender; legs I and IV as long as, or a little longer than body; tarsi I about as long as the preceding joint, tarsus IV plainly a little shorter than

the preceding joint, legs with long slender bristles, more numerous, but shorter, below than above. Mandibles with a slender blade and the opposite portion tipped with a process of several curved teeth; palpi short and stout, last joint scarcely longer than the preceding one.

Length, .8 mm.

From Tempe, Arizona, December 14, 1911 (A. N. Wilson), and Wagoner, Oklahoma, December 3, 1914, on wheat.

TETRANYCHIDAE.

Tetranychus antillarum n. sp. (Pl. XIV, fig. 5; Pl. XV, fig. 13).

Body yellowish, fully twice as long as broad, tapering at each end, with long stout bristles above; two each side in front, the anterior much shorter than the other, abdomen with five in a submedian row each side, and a sublateral row of four bristles, each as long as femur I. Legs shorter or barely as long as body, legs I and IV subequal, leg II about two-thirds as long as leg I, all with long bristles, one on the femur longer than the joint; claw of tarsus strongly bent. Mandibles (inside view) very broad just before tip, then suddenly concavely narrowed to the hook, which is small. Palpi very small and inconspicuous.

Length, .35 mm.

On leaves of *Leonotis nepetaefolia*, August 6, 1912, Rio Piedras, Porto Rico (T. R. Jones), also on *Asclepias curassavica*.

TETRANOBIA n. gen.

The stigmata are in a distinct horn each side at base of the mouth parts. Legs moderately long, first pair as long as the body; the tarsi are plainly shorter than the preceding joint, and end in a single claw. The body is furnished with fine, simple hairs like *Tetranychus*, and there is no four cleft plate on the front margin. The palpi are stout and the thumb tipped with fingers as in *Tetranychus*.

Type *Tetranychus longipes* Bks., and includes also the following new species.

Tetronobia decepta n. sp. (Pl. XIV, fig. 3; Pl. XV, fig. 15).

Body about one and one-half as long as broad, broadest behind the middle, and at this point very high; clothed sparingly above with a few, very short, simple bristles, mostly behind, but one pair on front margin over the mandibles. Legs very slender; leg I as long as body, II not half as long as leg I, III but little longer than II,

IV about as long as width of body; all tarsi shorter than the preceding joint, but more plainly so in leg I; all with long, scattered bristles, most of them more than twice as long as the width of a joint. Palpi very short and stout; thumb cylindrical, ending in three equal fingers.

Length, .65 mm.

From Mesa, Arizona, on barley, March 27, 1913, collected by R. N. Wilson.

TETRANYCHINA n. gen.

There are no prostigmatal horns; the legs are very long and slender, legs I and IV longer than body, and the tarsi much shorter than the preceding joint, each ending in a toothed claw, tarsi I a little enlarged near tip; palpi stout ending in thumb and fingers. Body with stout, usually serrate bristles.

Type.—*T. apicalis* n. sp.

Includes also, I presume, the *Neophylllobius harti* Ewing.

Tetranychina apicalis n. sp. (Pl. XIV, fig. 7).

Body less than twice as long as broad, strongly convex above, a pair of bristles on the front, and two pairs of erect bristles near the tip of abdomen, the hindmost pair almost clavate, both pairs arising from tubercles and are minutely serrate. Legs long and slender with a few very short, fine hairs; leg I much longer than the body; femur I nearly as long as the body; leg II hardly more than one-half as long as leg I, leg III longer than body, and leg IV much longer, but shorter than leg I, all tarsi shorter than preceding joint, and tarsi I plainly a little larger near tip than elsewhere. Palpi rather stout, with a slender thumb, ending in two equal fingers, and a stout bristle or finger, near the upper tip.

Length, .5 mm.

From St. Bernard, Louisiana, on white clover, March 24, 1912. (Parks).

STIGMAEOPSIS n. gen.

Basal part of mandibles united into a plate as in *Tetranychus*, and apical part long, styliform as in that genus. Legs thick throughout as in *Tenuipalpus*, but not wrinkled, two claws, tarsi as long as preceding joint; palpi long, large and porrect, with the thumb not extending beyond the claw. Skin not reticulate, but finely striated. Spinning small dense webs under which they live.

Stigmaeopsis celarius n. sp. (Pl. XV, figs. 9, 11).

Yellowish to greenish, mouth parts often reddish. Body about twice as long as broad, broadest in the middle, cephalothorax with two long bristles each side, one at humerus, four near tip of abdomen, a pair of large ones near the middle of dorsum, and several pairs of smaller ones above. Legs short, thick, hardly longer than the width of body, with a few simple hairs; one near tip of femur is very long. Palpi somewhat curved outwardly, with an out-turned curved apical claw, the thumb pointed. Mandibular plate narrowed at tip, not notched.

. Length, .3 mm.

From Oneco, Florida, living in small colonies under small, dense, white webs which are placed here and there, often near ribs, on leaves of bamboo (*Bambusa metake*) (Sasscer).

The description of the above three new genera in the Tetranychidae offers an opportunity to tabulate the genera of this family known to occur in our country. The length of the tarsi compared with the preceding joint, a character hitherto unused, readily divides the family into two sections.

1—Tarsi (at least tarsus I) much shorter than the preceding joint; at least leg I as long, or longer, than body.....	2
Tarsi as long as preceding joint; leg I rarely as long as the body	5
2—Front margin of cephalothorax with a thin four-lobed or cleft- plate; body with scale-like hairs.....	<i>Bryobia</i> .
No such plate on front of body	3
3—Body with simple hairs; prostigmata in a horn each side at base of mandibles	<i>Tetranobia</i> .
Body with spines or stiff serrate bristles; prostigmata not in a horn	4
4—Tarsi I enlarged a little toward tip; palpi stout.....	<i>Tetranychina</i> .
Tarsi I tapering to tip; palpi small and slender; coxae close to- gether	<i>Neophyllumbius</i> .
5—Dorsal surface divided into many small areas; claws two, very large	<i>Raphignathus</i> .
Dorsal surface not so divided.....	6
6—Palpi very slender, and not showing plainly the claw and the thumb arrangement; mandibles not elbowed near base.....	7
Palpi stouter, showing plainly the claw and thumb arrange- ment	8
7—Legs transversely wrinkled; large, bordered ventral aperture; eyes present	<i>Tenuipalpus</i> .

- Legs not transversely wrinkled; ventral aperture smaller; eyes indistinct *Tetranychoides*.

8—Prostigmata in a horn each side at base of mandibles; body short and broad, with large, prominent spines above... *Tetranychopsis*.
 Prostigmata not in a horn, or body not with spines..... 9

9—Mandibles styliform, elbowed near base; and with a supramandibular plate; body not elongate, and thumb not extending much beyond claw; spinning webs..... 12
 Mandibles less styliform, not elbowed near base; no supramandibular plate 10

10—Coxae close together; body rather short..... *Acheles*.
 Coxae in two well-separated groups; body elongate..... 11

11—Thumb extending much beyond the claw; palpi very long,
 Caligonus.
 Thumb barely extending beyond the claw..... *Stigmaeus*.

12—Palpi very long, porrect; legs short and thick to tip.. *Stigmaeopsis*.
 Palpi shorter, pendant; legs slender, and tapering to tips.... 13

13—Claws divided into four..... *Tetranychus*.
 Claws single, entire..... *Oligonychus*.
 Claws divided into two..... *Schicotetranychus*.

Paratetranychus Zacher = *Oligonychus* Berlese 1896.

This genus is made for *T. pilosus*; we have it in this country, and also in this genus are *T. bicolor*, *T. modestus*, *T. simplex* and *T. yothersi*.

Schizotetranychus Trägärdh.

This has recently been proposed for *T. schizophorus* Zacher; *T. mytilaspidis* and *T. pratensis* will go in this group. Trägårdh has divided *Paratetranychus*, using *Neotetranychus* for those species which have the single claw without a cluster of hairs at base: *T. bicolor*, *T. modestus* would go in it. *T. latus* and *T. banksi* on account of reduced claws would form a new sub-genus which may be called *Eutetranychus*.

PARASITOIDEA.

Spelaeorhynchus latus n. sp. (Pl. XIV, figs. 6, 8).

Yellowish; head and anterior part of shield brownish, a blackish spot on each side of the head and on each side of the shield in front; legs brownish yellow, except the pale articulations and bases of hairs. Head as long on sides as in middle, where it is faintly emarginate, above with crossed ridges. Dorsum of body as broad as long, broadest behind the middle, the posterior margin slightly emarginate in middle; a few short hairs above, one pair on front margin, on sides

one between legs I and II, one over leg II, two over leg III, and four on each posterior side, and three each side near tip, the latter longer than the others, and a few on disc, mostly near the outer margin. Dorsal shield about one and one-half times as long as broad, broadest at lateral angle, much narrowed behind; legs not as long as body, with short, simple bristles, mostly at base and tips of joints, and arising from hyaline spots. Venter with a triangular shield, broader than long, and with two hyaline spots each side, each with a hair; hind margin of coxa I with a spur behind; stigmal plate twice as long as broad.

Length, 1.6 mm.

From Obispo, Canal Zone, on bat, January (Goldman).

Differs from *S. precursor* in that the body is broader behind, in longer dorsal shield, in head less produced in the middle, in the longer stigmal plate, in shorter sternal shield, and the less hairy body. I consider that this genus is fully as closely related to the Parasitidae as to the Ixodidae, and would place it in a family in the superfamily *Parasitoidea*. The head is very different from the capitulum of the ticks; and the sternal plate, posterior genital opening, and the retractile mandibles ally it more to the *Parasitidae*.

Iphiopsis obesus n. sp. (Pl. XV, fig. 12).

Yellowish brown. Body pyriform, about one and one-half times longer than broad; the dorsum with a few scattered minute hairs arising from hyaline dots, venter with larger short, almost spinelike hairs; legs with simple hairs, and four each side on the sternal plate, the middle ones close together. Sternal plate, concave behind, not reaching behind coxae III; genital plate U-shaped, and plate rather large, broad in front, anus near its hind margin; on the venter are two transverse, corneous plates, the outer one the larger. Spiracles not twice as long as broad, elliptical; legs very stout, hardly as long as the width of body, each tipped by a very large caroncle, most of the joints (except the last) broader than long; first pair of legs not as stout and shorter than the others; palpi very hairy near tip.

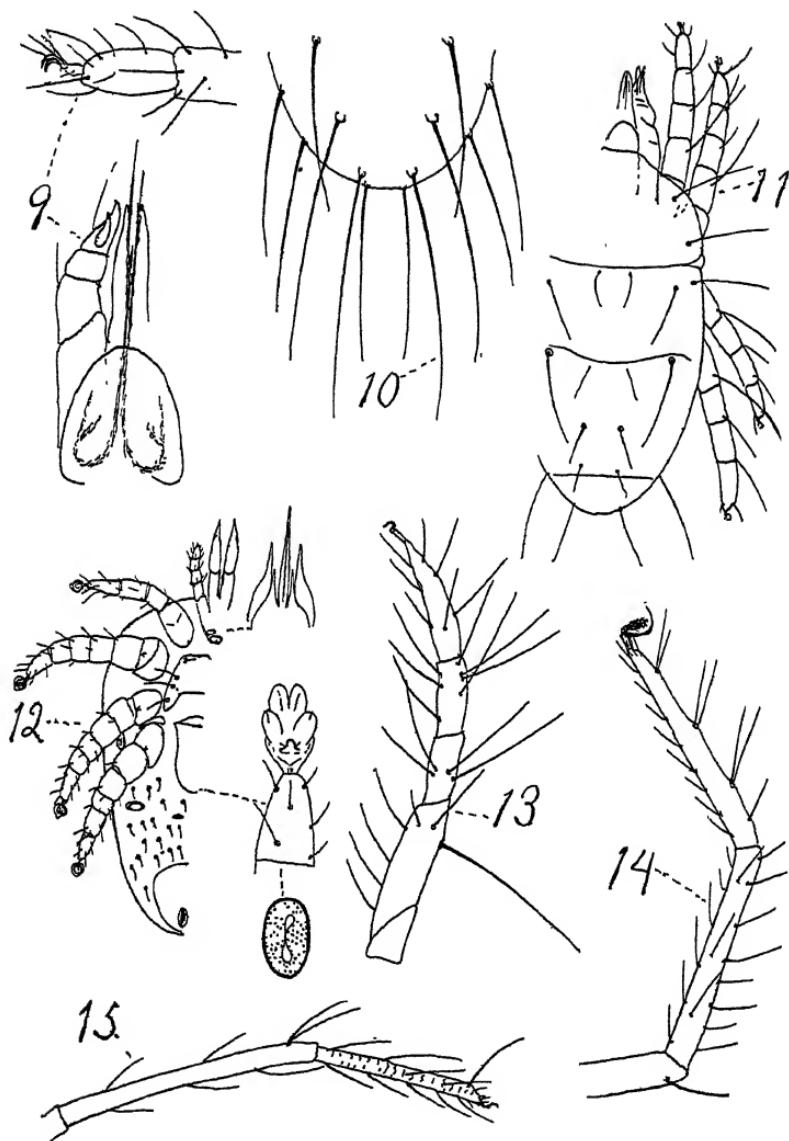
Length, .75 mm.

From Altamonte Springs, Florida (F. H. Lewton, coll.).

TYROGLYPHIDAE.

Tyroglyphus sacchari n. sp. (Pl. XIV, fig. 1; Pl. XV, fig. 10).

Body pyriform, about twice as long as broad, broadest behind the middle; cephalothorax rather long, much narrowed in front, the mandibles prominent. Dorsum with long, simple bristles behind, but not



NEW MITES—BANKS.

- 9, 11. *STIGMAEOPSIS CELARIUS.* 13. *TETRANYCHUS ANTILLARUM.*
 10. *TYROGLYPHUS SACCHARI.* 14. *NOTOPHALLUS VIRIDIS.*
 12. *IPHOIPSIS OBESUS.* 15. *TETRANOBIA DECEPTA.*

as long as in *T. lintneri*; in the female the bristles not as long as the body, in the male plainly as long as the body; also long humeral and cephalic bristles. In male the legs I and II are plainly larger than in the female; no spines on tarsi, only fine hairs, that at tip of penultimate joint as long as the tarsus, sense-hair on tarsus I longer than width of the joint at that place; tarsus I about as long as the two preceding joints together; tarsus IV slender, plainly a little longer than the two preceding joints together, only a faint, short hair at the tip of the hind tarsus.

Length, .35 mm.

From St. Croix, Danish West Indies, June 14, 1913, on sugar cane (D. Longfield Smith).

***Chortoglyphus gracilipes* n. sp. (Pl. XIV, fig. 2).**

Colorless. Body broad, subglobose, in front the mouth parts form a prominent beak, the mandibles are very large and short, the palpi with slender joints. No hairs above on body. Legs very slender, but not nearly as long as the body; the femora, patellae and tibiae are subequal in length, the tarsi extremely slender and nearly as long as the three preceding joints together; claws minute, all tibiae with a very long hair at tip, and in hind legs some hairs near apex of femora and patellae; tarsi with a hair toward base beneath, but no preapical ones visible. Genital aperture of female very large, as large as entire beak, nearly as broad as long, angulate in front. At tip of body is a prominent down-curved spine, and each side of it a fine hair.

Length, .3 mm.

From Tampa, Florida, August 5, in tobacco infested with the cigarette beetle (Runner). The first record of this genus in our country.

EXPLANATION OF PLATES.

PLATE XIV.

- Fig. 1. *Tyroglyphus sacchari*, legs I and IV.
2. *Chortoglyphus gracilipes*, under side.
3. *Tetranobia decepta*, mandible, palpus and spiracular horn.
4. *Notophallus viridis*, tarsus, palpus.
5. *Tetranychus antillarum*, palpus, mandible.
6. *Spelaeorhynchus latus*, dorsum.
7. *Tetranychina apicalis*, side, tarsus I, and palpus.
8. *Spelaeorhynchus latus*, sternum and spiracle.

PLATE XV.

9. *Stigmaeopsis celarius*, tarsus I, palpus with supramandibular plate.
10. *Tyroglyphus sacchari*, tip of abdomen.
11. *Stigmaeopsis celarius*, dorsum.
12. *Iphiopsis vbesus*, venter, peritreme, caroncle and epistome.
13. *Tetranychus antillarum*, leg I.
14. *Notophallus viridis*, leg I.
15. *Tetranobia decepta*, leg I.

New Bees from Costa Rica (Hym.).

By T. D. A. COCKERELL, Boulder, Colorado.

Epicharis phenacura n. sp.

♂. Length about 21 mm.; anterior wing, 17 mm.; black, the head, legs and abdomen (but not the thorax) marked with yellow; eyes very large, orbits diverging below; vertex and front with dark brown hair, cheeks with brownish-white; mandibles black with minute yellow spot at base; labrum, clypeus (except a broad black band on each side, not reaching upper margin), semi-circular supraclypeal mark, lateral face-marks (which are narrow, with a linear extension above), and nearly all of front of the short and very thick scape, all light yellow; clypeal ridges distinct, but obtuse; flagellum dark.

Thorax with short dense hair, dark greyish-brown (seal-brown) above, gradually becoming rather paler below, scutellum bigibbous; tegulae dark; wings fuliginous; upper and lower sides of second submarginal cell nearly parallel, recurrent nervure joining lower side very slightly beyond the middle; knees with yellow spots; anterior tibia with yellow band on basal half; spur of middle tibia contorted, and abruptly bent apically; tarsi ferruginous, more or less infuscated basally, apical joint mainly yellow; hind basitarsi broad and long, pale reddish, with a prominent angle in front beyond the middle; hind tibiae and especially tarsi with long ochreous hair behind; hind femora with brownish-black hair.

Abdomen not at all metallic; first segment with a narrow yellow band, failing in middle; segments 2 to 4 yellow, except a broad apical dark band; segments 5 to 7 honey-color; apical plate very large, narrowly truncate at end.

San Carlos, Costa Rica (Schild and Burgdorf). U. S. Nat. Museum. This remarkable species resembles *Centris flavopicta* Smith in many respects, but it has the structure of *Epicharis*. In Friese's table of *Epicharis* it runs near *E. fasciata* Lep., from Bahia, but is quite distinct.

Epicharis conura n. sp.

♀. Length 22-24 mm.; anterior wing 16 mm.; black, with conical ferruginous abdomen (not marked with yellow), the first segment with the dorsal surface black, but the basin (especially its margins) red; hair of head and thorax mainly black, but becoming grey on cheeks, sides of thorax and metathorax, quite pale on lower part of pleura; mandibles black; labrum large, with three small yellow spots or a large yellow triangle; clypeus with a minute yellow dot in middle of the flattened, shining disc, and a pair of spots, more or less obsolete, near lower margin; a small triangular yellow supraclypeal mark; lateral

face-marks elongate, more or less semi-lunar, contiguous throughout their length with orbits; scape very short and thick, without light markings; apex of third antennal joint, the short fourth joint, red beneath, the extreme apex of flagellum also reddish; mesothorax granular, with scattered small shallow punctures; scutellum deeply emarginate behind; tegulae black; wings dark fuliginous; legs black, the anterior and middle ones with mainly black hair, the hind tibiae and tarsi with an enormous pale golden scopula; abdomen dull; apical plate concave, broadly truncate.

San Carlos, Costa Rica (Schild and Burgdorf). U. S. Nat. Museum. One specimen bears the number 5. Related to *E. conica* Smith (which I have from Maroni, Guyana), but larger, with yellow markings on head in female, and the scutellum differently formed.

Life-history and Habits of the Larger Waterstrider, *Gerris remigis* Say (Hem.).

By J. R. DE LA TORRE BUENO, White Plains, New York.

Of all the bugs I know, I can think of none so amorous as our common large water-strider, *Gerris remigis* of Say. From the earliest days of spring, when the Frost King releases the waters from his bondage, till the cloudy days of autumn, when the leaves fall and the winds grow bleak at his return, these beasties are common and familiar sights to the lover of the quiet flowing waters running to the distant seas. In these haunts, in some still little bay or moveless backwater, under a bridge, or in the shadow of a tree, or in the cool recesses of an overhanging bank, you may see *remigis* gathered in numbers, rowing silently about, now and again skipping to escape the maw of some greedy fish, or pouncing on some unfortunate insect fallen into the water and struggling to escape from the clutches of that deadly element. Here they rear large families and spend at ease the sultry dog-days. When winter comes again the old generation have passed away and their young descendants, now full-grown, seek shelter against frost and snow under nearby logs or stones on the banks, or crevices in them; there to sleep until in the round of days Old Sol routs the chills of winter and spring once more ushers in the leaves

and flowers, and vivifies all the reproductive powers of nature, in which *Gerris* is not the least factor.

That great American naturalist, Thomas Say, who, finding himself in a new Paradise, like Father Adam of old, spent his days busily giving names to the theretofore nameless multitude of living things which delighted his eye, was the first to recognize *Gerris remigis* as distinct from the European *G. paludum* Fabricius, describing it in 1832. Since his day other entomologists have referred to his species more or less at length, among them Packard, Comstock, Uhler (who has given by far the best account of the insect in the Standard Natural History), and Howard, till we come to the present, when it has been the subject of many short articles and studies. Uhler has been heretofore the source of most of our information on this species and in the work mentioned he briefly describes its habits. The scantiness of information about the life and habits of *Gerris remigis* and of the other nearly-related forms led me to try to work out a life-history by breeding the species in aquaria. This was begun some nine or ten years ago and brought to a partial close in 1908, when, after some trouble, a single specimen was brought through to maturity.

In nature the life-history of *Gerris remigis* appears to be briefly this: Breeding and oviposition begin as early as February, or in the first warm days of spring. (I have found them mating in early April, while one still slept under a stone.) It is seemingly continuous all through the summer, and it is not unusual to find nymphs in various stages in company with the adults. I have found them thus in late May and as late as the middle of October, nymphs in two or three stages being together. The mother lays her cylindrical pearly eggs end to end along the edges of grasses or other vegetation growing into the water, to which she attaches them by means of a colorless waterproof glue. Here they develop more or less quickly, according to the temperature, the little bugs showing day by day more and more plainly through the shell. At the end of a week or ten days they burst the shell and escape into the water. The little bugs remain submerged for an hour or two, swimming about, until finally they succeed in piercing the surface

film and by main strength wrench themselves free from its fatal clutches. Some, indeed, perish by drowning, although their vitality is surprising. In time, some six days or so, they cast their skins with accompanying changes in structure. This takes place four times more before they reach the perfect insect at the end of about six weeks. It is thus possible for *G. remigis* to have at least three generations in a summer, if not more, depending, of course, on the length and temperature of the season.

For food *Gerris remigis* depends on other insects and it is very voracious. I have found it sucking *Capnia necydaloides*, the small stone-fly, abundant in this latitude, so very early in the spring that it is frequently frozen into the snow when the sun that melted its surface no longer shines upon it.

In the aquaria it is fed flies, the most common, abundant and obnoxious insect of the summer, although any other insect would do as well. A specimen I had in an aquarium played havoc with the other living things, devouring such tough customers as *Notonecta* and *Dineutes*, after a long struggle, in which each was endeavoring to get the other. It finally perished to a *Notonecta irrorata*. If sufficiently hungry they will feed on their own nymphs and even on each other.

Polymorphism is not displayed by this species, which is only dimorphic, being found, but very rarely, fully winged, its common form being apterous. The possession of wings always causes a change in the structure of the thorax to accommodate the much enlarged muscles which the use of organs of flight requires. These winged adults are generally found solitary in the most unlikely places—isolated little pools, springs, rock-holes, beach drift¹, far from the favorite haunts of this stream-loving bug.

The manner in which it uses its legs for propulsion is quite interesting. The first pair is prehensile and is used to hold its prey. In locomotion its tarsi only touch the surface of the water. The bug rows itself with the middle legs only, the tarsi being in contact with the water along their entire length,

¹ 1915. Heteroptera in Beach Drift. Bueno, Ent. News xxvi: 277.

while the third pair is used only in steering, both tibia and tarsus lying on the surface for this purpose. The wings, when present, are serviceable, the European forms being recorded as using them in night flights, not observed with our species.

It is said that when closely pursued *Gerris* dives to escape and swims under water, but I have never been able to induce or force any of those I have seen to perform for me.

Gerris remigis is parasitized by a bright red water mite, which attacks it in all stages of development. I have found in midsummer an individual with head completely covered with these larval mites, excepting the eyes and beak; a winged specimen had the thorax invaded. In September a young nymph was taken similarly infested. Matheson and Crosby² observed the minute Proctotrypid, *Limnodytes gerriphagus*, also known in Europe as a parasite of gerrid eggs, ovipositing on those of *remigis*, one to each egg.

The external anatomy of *Gerris remigis* is fairly known, but so far no one has worked out the internal anatomy and physiology of the species. Dufour³ investigated the anatomy of its European congener, *Gerris najas* de Geer (*canarium* Dufour). He studied the digestive tract, the hepatic and the reproductive systems, and in pl. V, Figs. 59-64, he illustrated certain anatomical details and also the digestive tract. He states that "the stigmata of *Gerris* are of microscopic size and very difficult to detect because of the lustrous silky pile which covers them. There are six pairs, all near the outer edge of the venter, outside of darker lines." He also says the trachea are tubular and elastic and of capillary fineness. Dufour also remarks that it has an alcalescent odor and quotes De Geer as calling it buggy. I myself have not noted this in *remigis*. Bergroth⁴ describes a perforated median tubercle in the metasternum, which he calls "omphalium," and queries if it be the unpaired

²1912. Ann. Ent. Soc. Am. v: 67. Aquatic Hymenoptera in America. Robert Matheson and C. R. Crosby.

³1833. Recherches Anatomiques et Physiologiques sur les Hémiptères. Mémoires de Savans Etrangers, pp. 197, 346, 371, 400.

⁴1902. On the Thorax of the Gerridae, Ent. Mo. Mag. (2), xiii, 258-260.

opening of the stink-gland. This omphalium is perfectly visible in *G. remigis*, in specimens with a reddish venter; in dark individuals it is difficult to see, but with care may be detected readily. It also appears to vary in size somewhat and is placed at the caudal margin of the metasternum, right at the suture. N. Leon⁵ states that the *Gerridae* have labial palpi, which I have not detected in our species. Fyles⁶ finds *remigis* weighs one grain. Henneguy⁷ refers to the number and structure of the malpighian tubes in the genus and to the pulsatile organs in the legs (p. 87), quoting Locy and Behn. Uhler records that it varies in color, a circumstance scarcely worth noting, as it cuts no figure specifically, which is the reason for its mention here. Some species are recorded to fly by night, but ours have not been observed doing so. Two fossil species of the genus are known from Canada, perhaps the ancestors of our forms.

Gerris remigis is extremely hard to keep in confinement. No sooner is it in an aquarium than it begins to dash itself madly against the sides. Now and again a tamer specimen is secured and such will even breed in confinement. Ordinarily, however, they get water-logged from their frantic efforts and, sinking, drown. But even these sunken individuals, after some time, as Mr. C. E. Olsen has observed, if rescued before it is too late and carefully dried, may return to active life. *Gerris remigis*, like all the other semi-aquatics, is densely clothed with a velvety pubescence in all instars, which it furnishes and preens and currycombs constantly, by means of the tibial combs, with which each tibia is furnished, a toilet necessity found in them from their earliest youth.

A very careful study of the reactions of *Gerris* has been made by Christine Essenberg⁸. She studied the Californian

⁵ 1897. Beiträge zur Kenntniss des Labiums der Hydrocorae. Zool. Anz. Bd. 20, No. 527.

⁶ 1910. 41st Annual Report of the Entomological Society of Ontario, p. 53.

⁷ 1904. Les Insectes, p. 80.

⁸ 1915. Journ. An. Behav. v., No. 5, pp. 307-402. The Habits of the Water Strider *Gerris remigis*.

Gerris orba Stål, which differs in some habits from ours, for instance, in floating on its back, something never noted in *remigis*, and in taking to land to escape pursuit. *Remigis* generally skates away at top speed and is quite expert at turning and twisting to avoid an enemy. She also notes death-feigning, especially in some individuals. A number of other interesting tests were made which might with advantage be repeated on *Gerris remigis*.

Life history notes on *Gerris conformis* and *Limnogonus hesione* were published by Carl J. Drake⁹.

Gerris remigis is well illustrated in a number of places, the best being Fig. 8 in Comstock's Insect Life, and Fig. 225 in Folsom's Entomology.

Gerris remigis mates "par superposition," as Gadeau de Kerville has it¹⁰ and as Amyot and Serville describe for *najas*¹¹. The period of gestation is not known, nor the number of eggs one female is capable of laying, although this has been determined for other species of the genus.

Egg. Long cylindrical, rounded at both ends and slightly concave at the micropylar end. There is one micropyle, and the chorion is somewhat thickened at this end, except at the concavity, where it thins somewhat. It is clear white in color when freshly deposited and the chorion is roughened superficially but not sculptured in regular designs. The egg is attached to the aquatic plants by a clear, colorless waterproof glue secreted by the female.

This reproduces the observations of Dufour (*op. c.*) already cited, and those of Uhler (*op. c.*).

In an aquarium they were attached to a little piece of wood, provided as a resting place, especially on the submerged part, but apparently were not glued on. The eggs develop in about two weeks or ten days, and the little bug emerges. It does not hatch out through a cap or lid, as do many of the Heteroptera, but through a simple slit lengthwise of the chorion, which splits it for a varying distance in a straight line, at times not quite one-half its length, at others nearly to the other end from the micropyle.

⁹1915. Ohio Nat. xv: 503.

¹⁰1902. Bull. Soc. Ent. Fr., p. 68.

¹¹1846. Hist. Nat. Hem. p. 415.

Nearly immediately on emerging the nymph casts a diaphanous pellicle, very soft and hairy, so soft that it does not retain its shape at all and is nearly invisible on the surface of the water. This pellicle, which I prefer to consider in the nature of an amnion rather than as a true molt, shows the one-jointed tarsi, subapical claws, tibial combs on all legs, but the other details are much obscured. The covering hairs are long and matted. As already noted the just-hatched nymphs sink and have to break through the surface film before beginning active life.

Nymph, First Instar. The antennae are moderately stout, joint 2 shortest, 4 longest, as long as 1 and 3 together, next in length being 1 and 3. The ommatidia are round. All the tarsi are 1-jointed and all the tibiae have combs. The first pair of legs is shortest and the 3d longest; the tibia and femur are subequal in the first pair; in the second the tibia is longer than the femur and in the third shorter. The legs are set apparently very far back, due to the excessive shortness of the abdomen arising from the very narrow, ringlike segments. The head is rounded and hairy with a few scattering long setae. The rostrum is stout, with the third joint longest, then the 4th, followed by the 2d and 1st in that order. The 4th is black and tapering.

Second Instar. This instar is much the same as the first, except that the legs are not apparently so far back on account of the lengthening of the abdomen. It is also changed as follows: The first pair of legs continues the shortest, but the second is the longest; the tibia of the first pair is shorter than the femur and in the second pair they are subequal, while in the third pair the tibia continues shorter. The second joint of the antennae is the shortest; the first and third are subequal and the fourth longest as before. In the cast skin in this and all instars, the second joint appears cupped at the distal end and the third joint is sunk into it nearly half way. In this instar in the cast skin, from which these dimensions and proportions were taken, a long spiracle is seen on the propleurae, near the upper edge.

The nymph in this and other instars was mounted in balsam, and in this case too much shrunk for exact study.

On emerging from the first molt, the nymph is very translucent and rather colorless, excepting the eyes, which are red.

Third Instar. In this the nymph is as in the first, except as follows: The anterior femur and tibia are subequal, the proportional length of the legs and proportional length of leg joints remaining as before. The antennae are as before, except that the third joint is longer than the second, the first longer than either, the fourth continuing the longest.

Fourth Instar. The greater part of the characteristics of the nymph are as in the preceding instar. The antennal joints show the greatest change. Joints 1 and 4 are equal and longest; joint 2 continues the shortest, half as long as 1 and two-thirds as long as 3. The hind and middle femora show dark spots from each of which springs a long hair or seta. Scattered thorns are also seen on them.

Fifth Instar. This cannot be described, as the only specimen brought to maturity died while molting and the cast skin was not available. The excessive heat and moisture of the aquarium apparently weakened it.

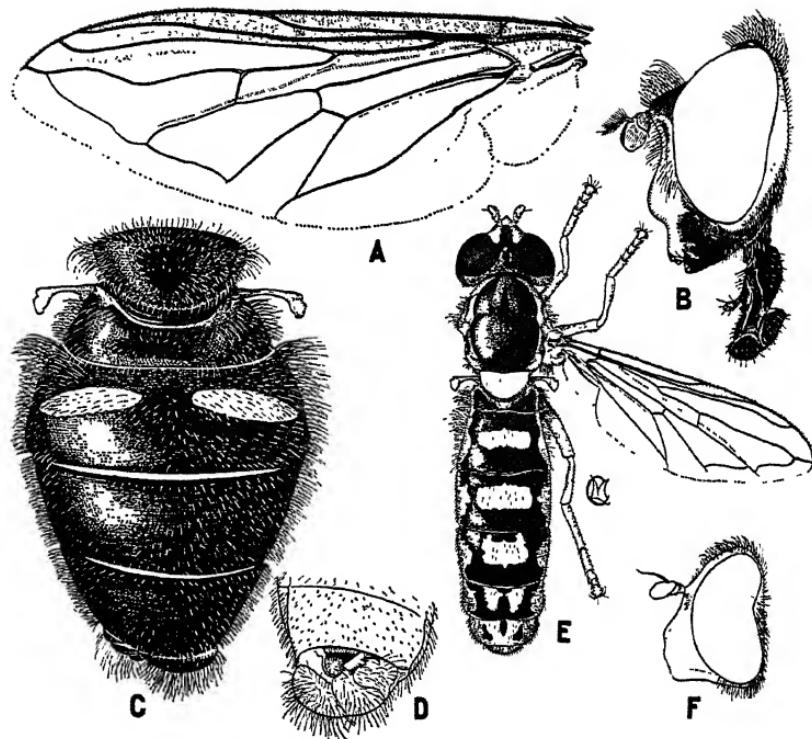
Burmeister states that the nymphs of *Gerris* may be distinguished from the adult by having single-jointed tarsi. This is the case with *G. remigis*, which shows no sign of two tarsal joints in the fourth instar, but has them in the adult.

Table of development of Gerris remigis Say.

Oviposited.....	April 6; May 31; Aug. 3	12 days
Emerged.....	April 19; June 12; Aug. 15	12 "}
Molt I.....	April 26; June 16, 17, 18;	Aug. 21 6 "
Molt II.....	June 20, 21, 22, 24;	Aug. 27 6 "
Molt III.....	June 25, 30;	Sept. 1 5 "
Molt IV.....	July 5, 6;	Sept. 8 7 "
Molt V.....	Sept. 18	10 "
Total days—37 (four molts).....		46 (Complete cycle)

From the above it is seen that the embryonal and four nymphal stages took thirty-seven days, from the end of May to early July; the complete cycle, from oviposition to the adult, took in August and September, forty-six days, which, assuming a period of ten days for the last nymph, would make the time nearly equal. These are aquarium results, and this condition makes for stability, in that the moisture, heat and food are all there, and that there are not the fluctuations there would be in the open, with cool June days and a precarious food supply. In nature, I would look for decided variations in the period, depending on the temperature largely. The embryonal period ranged from ten to twelve days; the first nymph from four to seven; the second, four to six; the third, from five to ten; the fourth, from five to ten, and the fifth (one example), was ten days. Mr. C. E. Olsen, working independently, found the fifth instar fifteen days long, in late June.

In conclusion I urge the complete and detailed study of the life history of this bug, which, it is evident from this rough preliminary sketch, presents many interesting problems.



NEW SYRPHIDAE—METCALF.

A-D. *CINXIA CAROLINENSIS*.

E, F. *SPHAEROPHORIA CLEOAE*.

Two new Syrphidae (Diptera) from Eastern North America.

By C. L. METCALF, Ohio State University, Columbus.

(Plate XVI).

*Cinxia** *carolinensis* new species (Plate XVI, figs. A, B, C, D).

At once distinguished from the described North American species in lacking the black facial stripe and in having but a single fascia, or pair of spots, on the abdomen.

♂. Length 10 to 11 mm. Vertex black, but little shining, with dusky yellow pile much lighter on the occiput. The eyes contiguous or nearly so for about the length of the vertical triangle. Frontal triangle densely whitish yellow pollinose, except for a shining black lunule above the base of the antennae and a very slender, median, impressed line. In some lights the blackish ground color shows through, especially next the eyes. The front covered with very delicate, silvery pile which continues down the sides of the face, gradually thinning on anterior orbits to the lower corner of the eye. Face yellow; whitish yellow pollinose like the frons, except for a broad glabrous band over the tubercle, but not reaching the base of the antennae, which is shining waxy yellow. Cheeks (jowls) brownish black with moderate pale pile and a broad contiguous band in front of the jowls from eye to oral margin deep shining black, bare. Anterior mouth edge narrowly blackened.

Face in profile (Plate XVI, Fig. B) much produced downward and forward, more than usually concave below the antennae and with a prominent tubercle about equaling the frontal prominence; abruptly constricted below the tubercle and thence straight to oral margin. Lower mouth edge convex, forming with the plane of the occiput an angle of about 130°. Posterior orbits somewhat inflated below, whitish pollinose, and with delicate pale pile. Proboscis and palpi entirely brownish black, about as long as the depth of the eye.

Antennae brownish yellow, the first two joints darker, the third joint subquadrate, with angles much rounded, a fifth deeper than its length on the inner side beyond second joint. The arista two and one-half times this length, basal, reddish yellow, plumose, with about a dozen rays on the upper side not extending to the tip and two-thirds as many below, the latter wanting on the basal third and at the tip.

Mesonotum moderately shining bronze black, with thick but delicate yellow pile, humeri whitish pollinose. The scutellum obscure reddish brown to black with similar pile. Pleurae shining black with thinner pile. A small indistinct brownish yellow spot on the upper sternum.

**Cinxia* Meigen (1800)—*Sericomyia* Meigen (1803).

pleura and another above the middle coxa on the pteropleura. Plumula and tegulae white, the latter with yellowish pile, halteres yellow.

Abdomen (Plate XVI, Fig. C) about one-fifth longer, and the second and third segments broader, than the thorax, broadest at end of second segment; black, moderately shining, rather strongly arched, with moderate pile, which is black on the posterior margin of the second and on the disk of the third and fourth segments, elsewhere yellowish, longer on the venter, on the genitalia and at the sides of the second segment where it is also denser, but in no place obscuring the ground color. An interrupted yellow fascia on the anterior half of the second segment which takes the form of two narrow, elongate, slightly oblique spots, a little less than one-fourth the width of the segment and attenuated somewhat toward either end; interrupted by more than twice their width and separated from the lateral margin by one-half more than their width. The black of the segment contiguous to these spots is opaque. Elsewhere the abdomen is immaculate except for a slight margin of yellow on some of the genital plates posterior to the fourth segment. Venter with yellow as follows: posterior angles and narrow posterior margin of first segment, the second segment except a median black spot, and a stripe on the posterior margin of the third segment. Elsewhere, including the genitalia, black, shining.

Wings (Plate XVI, Fig. A) on the costal third brownish, clouded, occupying most of the costal, subcostal and marginal cells. Veins brownish throughout. Anterior cross-vein four-ninths the distance from base of discal cell, the third longitudinal vein broadly but considerably bent into the first posterior cell, the latter pediform.

All the femora slightly thickened, hind pair very slightly curved; including the coxae, reddish to blackish brown, the tips yellow. Tibiae yellowish, the anterior ones slightly, the hind pair much infuscated in the middle. Tarsi yellow, the last two joints brownish. Pile chiefly pale yellow, longer on the femora.

Described from two males: The *type* collected by the writer at Raleigh, North Carolina, in mid-April, 1914, about blossoming pear; in the author's collection. *Paratype* (without head) collected by Mr. Franklin Sherman, Jr., at Raleigh, North Carolina, in late March, 1908; in the collection of the North Carolina Department of Agriculture.

Sphaerophoria cleoae new species (Plate XVI, figs. E, F).

♀. Length 8 mm. Vertex deep blue black, moderately shining. The black encroaches to a variable extent on the frons, particularly as a median stripe narrowing toward, and not reaching more than half-way to, the base of the antennae, or sometimes reaching nearly to the latter

and widening slightly to form a biconcave arch above their bases. The black also projects on each side as slight points along the eyes. Remainder of the frons, the face and cheeks entirely wax yellow, shining, or, rarely, the cheeks and jowls slightly infuscated or even entirely blackened. The anterior mouth edge sometimes narrowly blackish and more or less infuscation on the facial tubercle but not forming a definite stripe. Posterior orbits densely pollinose and pilose; with somewhat flattened silvery white pile on lower half, infuscated and with delicate brownish yellow pile above. Pile of vertex black, that of frons mostly pale yellow, delicate. The face nearly bare a few very short delicate pale yellow hairs. Cheeks long yellow pilose. Antennae of the same color as the face, the third segment rounded, about as deep as long, the upper and distal parts more or less infuscated; the first and second segments entirely pale yellow with minute stiff black hairs especially on the upper side. Arista brownish, bare, somewhat thickened on the basal third.

Face in profile (Plate XVI, Fig. F) prominent, slightly concave from antennae to tubercle and again slightly constricted before the mouth edge. On lower part produced forward about half the width of the eye. Anterior mouth edge not equaling the tubercle.

Thorax brownish black, moderately shining, with two faintly whitish pollinose, narrowly separated stripes, obsolete behind. The lateral margins broadly and brightly yellow on humeri and to the suture, thence a little less brightly but still distinctly yellowish to the scutellum. Pleurae with the usual distinct yellowish spots on the prothorax, meso- and meta-pleurae and on the upper parts of sterno- and ptero-pleurae. Scutellum, plumula, squamae and halteres entirely yellowish. Pile of the dorsum yellow, fine, moderately abundant; the lateral margins, the scutellum, and more or less of pleurae with delicate pale yellow pile.

Abdomen black, with doubly interrupted yellow fasciae, moderately shining, the lateral margins continuously yellow. First segment metallic shining, the lateral margins broadly and a very slender line on the anterior margin yellow. *Second, third and fourth segments each with an arcuate, yellow crossband, which is completely or nearly interrupted on each side about a third of the way from the lateral margin to the middle line.* The lateral parts of the arcuate bands consist of more or less prominent angular projections antero-mediad from the lateral margin. Fifth and sixth segments each with an interrupted, arcuate yellow band, the halves resolved into somewhat hammerlike yellowish spots. Sometimes these segments all yellowish except a median spot and one on each side blackish. Narrow posterior margins of third to fifth segments yellowish. Remainder of abdomen and the venter all yellowish.

Legs including the coxae and trochanters pale yellowish with fine black hairs on femora and hind tibiae and tarsi; on the coxae long pale

yellowish. Tarsi usually slightly infuscated, rarely quite black. Wings transparent, the stigma alone slightly yellowish; veins brownish.

Described from fifteen females taken at Orono, Maine, chiefly about blossoming mustard. Seven paratypes August 11, 1915; the *type* August 16, 1915, three paratypes August 19, 1915, three paratypes August 24, 1915, and one paratype July 12, 1916. Named in honor of Mrs. Cleo Fouch Metcalf, who collected the first and the type specimens. The type is in the collection of the writer, paratypes in the collections of the Maine Agriculture Experiment Station and the Ohio State University.

EXPLANATION OF PLATE XVI.

Cinxia carolinensis n. sp. ♂.

Fig. A—Wing, X 8.

Fig. B—Head, lateral view, X 8.

Fig. C—Scutellum and abdomen, dorsal view, X 8.

Fig. D—Genitalia, ventral view, X 7.

Sphaerophoria cleoae n. sp. ♀.

Fig. E—Dorsal view, X 5.5.

Fig. F—Head, lateral view, X 8.



Lycaena lygdamus Doubleday and its Races with a Description of a New One (Lep.).

By HENRY SKINNER.

So far as I am aware the typical form of this species is very rare in collections. We have two specimens collected by James Ridings in Hampshire County, Virginia (now West Virginia) in 1857. Last spring, Morgan Hebard presented a fine pair to the Academy, taken at Hot Springs, Virginia, May 7th, at an elevation of 2,500 feet. These specimens agree perfectly with the excellent description of the species by Doubleday. The type locality of *lygdamus* was, in all probability, Jacksonborough, Screven County, Georgia. This county is on the extreme eastern border of the State about the middle line. They were collected by Abbot and we are indebted to Dr. S. H. Scudder for information in regard to this famous old collector and artist.* Abbot lived in Jacksonborough, but the town no longer

*Butts. Eastern U. S. & Can. 1, p. 651.

exists. Doubleday says the specimens he described in 1842 were sent to England by Abbot, that they were taken in pine woods, March 21st, and that the species is very rare. Doubleday says Abbot confounded the species with *Papilio erebus* Fabr. = *damaetus* Hübn.

The next name proposed was *behri* Edw. in 1862, and the locality given was "California, from Dr. Behr." It is likely from this that the type locality was San Francisco. *Behri* is larger, lighter in color and of more violet blue than *lygdamus* and the spots on the underside of the primaries are larger than those of the secondaries, whereas in *lygdamus* the spots are of the same size.

Oro Scudder was described in 1876, and the author says, "I have only seen this species from Colorado." The description says it is close to *behri* but averages larger. The upper surface of the wings of the male is almost entirely destitute of the pruinose bloom of *Nomiades lygdamus* and is of a tenderer blue, which permits all the spots of the under surface to be seen upon the upper side. *Oro* is exceedingly close to *behri* and some specimens are difficult to separate except by the locality labels. The name may be retained for the central area form or the connecting link.

Couperi Grote was described in 1874, from the island of Anticosta, Canada. Scudder says it extends from Anticosta and southern Labrador to Lake Winnipeg and the Saskatchewan. *Afra* Edw., 1883, was described from "the Deer River" country, from specimens taken by Captain Geddes. This was described from the female and may be considered a synonym of *couperi*. *Couperi* covers the area from Illinois to Alaska and from Canada to Colorado. It varies greatly in size but is smaller than *behri* and *oro*. I can't think of any species of *Lycaena* that varies more in size than *lygdamus* and its races.

There is another form for which I propose the name *Lycaena lygdamus columbia* new race.

It is of a deeper shade of blue than the other forms and the texture of the wings is less delicate. The spots on the underside of the wings are larger than in *behri*, but not as large as

those of *lygdamus*, nor is it as dark in color below as *lygdamus*. It is the largest form, the males expanding 30 mm. and the females a trifle more.

Described from *type*, male, from Port Columbia, Washington, April 25th, 1916, and *paratypes*, one male and two females, with the same data. They were sent to me by Mr. J. C. Hopfinger. There are other specimens from Olympia, Washington; Corfield, Vancouver; and Lake Tahoe, California. Typical *lygdamus* is darker in color on the underside and the black spots are larger and the surrounding white line relatively smaller than in any of its races.

Scudder made *lygdamus* the type of his genus *Glaucopsyche*, but later* placed it as a synonym of *Nomiades* Hübn. The species nearest to *lygdamus* is *xerxes* Boisduval and its forms. I have examined about 150 specimens of *lygdamus* and its forms from various localities. The species flies during March, April and May, according to latitude and elevation, but is found a trifle later in the far north. We possess a few specimens taken in early June at Eagle, Alaska, and at Banff, Alberta, Canada. Our specimens are from Eagle, Alaska; Banff, Alberta; Great Slave Lake, Canada; Beulah, Manitoba; Labrador; Anticosta, Quebec; Osoyoos, British Columbia; Corfield, Vancouver; Port Columbia, Washington; Umatilla and Fort Klamath, Oregon; Los Angeles, Riverside, Truckee and Lake Tahoe, California; St. Ignatius, Montana; Madison, Wisconsin; Taylors Falls, Minnesota; Denver and Fort Collins, Colorado; Chicago, Illinois; Virginia and West Virginia.

Additions to Insects of New Jersey, No. 5.†

By HARRY B. WEISS, New Brunswick, N. J.

According to Mr. Chas. Schaeffer, in the Journal of the New York Entomological Society, vol. 24, p. 167, *Elater carbonicolor* Esch., listed in Smith's "Insects of New Jersey" on page 285, is an Alaskan species and should therefore be dropped.

*Can. Ent. 1876, p. 21.

†See the News, xxvii, p. 162. April, 1916.

The species in question was *Elater rubricus* Say wrongly identified as *carbonicolor*.

The present list contains over one hundred species and I am greatly indebted to Mr. S. A. Rohwer, Mr. Morgan Hebard, Mr. Harold Morrison, Mr. E. R. Sasscer and Miss E. M. Patch for identifications in their respective fields and also to Mr. H. B. Scammell, Mr. A. S. Nicolay and others whose names are mentioned in the text for their kindness in notifying me of their findings.

Inasmuch as the 1909 list contains many Staten Island records, attention is called to the following publications of Mr. Wm. T. Davis dealing with the insect fauna of that island: *List of Macrolepidoptera of Staten Island* (Proc. S. I. Assoc. Arts & Sciences, vol. III, part I, October, December, 1909), *Notes on Macrolepidoptera of Staten Island* (Proc. S. I. A. A. S. vol. IV, parts I and II, October, 1911, May, 1912, vol. V, parts III and IV, October, 1914, May, 1915).

Order NEUROPTERA.

Rhyacophila formosa Banks. Delaware Water Gap. (Slosson) (Trans. Amer. Ent. Soc. vol. 37, p. 353).

Wormaldia plutonis Banks. Delaware Water Gap. (Slosson) (T. A. E. S. vol. 37, p. 358).

Order HOMOPTERA.

Micrutalis calva Say. Pemberton, June 21, on black walnut. (H. B. Scammell).

Thionea bullata Say. New Brunswick, VII, 24. (Coll.).

Stenocranus dorsalis Van D. Whitesbog, Oct. 21, sweeping cranberry vines. (H. B. Scammell).

Megamelus nigrodorsum Crawf. Pemberton, Oct., 1914 (H. K. Plank) July, 1914. (H. B. Scammell).

Diedranotropis cubana Crawf. Whitesbog, Oct., 1914. (H. B. Scammell).

Platymetopius irroratus Van D. Pemberton, Sept., 1914, Browns Mills, June, 1915. (H. B. Scammell).

Platymetopius nasutus Van D. Pemberton, June, 1914. (H. B. Scammell).

Thamnotettix melanogaster Prov. Cookstown, Oct., 1914, (H. K. Plank).

Psyllia buxi Linn. Springfield, Rutherford, East Orange, River-ton, July, August. (Dickerson & Weiss). An imported species which has become established in New Jersey on boxwood.

Trioza alacris Flor. Rutherford and other places on *Laurus nobilis* in greenhouses during winter and outside during summer. Nymphs curl leaves of host doing considerable damage. Introduced several years ago from Belgium. (H. B. Weiss).

Aphis pseudobrassicae Davis. Freehold (Headlee) and undoubtedly other parts of the state. The false cabbage aphid.

Macrosiphum luteum Buckton. Summit, in greenhouse on orchids. (H. B. Weiss).

Rhopalosiphum rhois Monell. Arlington, July 8 on *Rhus copallina*. (Dickerson & Weiss).

Saltusaphis americanus Baker. Whitesbog, Oct. 21, 1914, on bog grass. (H. B. Scammell). (Canad. Ent. vol. 49, p. 3).

Saltusaphis ballii Gill. Whitesbog, XI-13, 1915, on 3-square grass. (H. B. Scammell). (Canad. Ent. vol. 49, p. 4).

Saltusaphis elongatus Baker. Whitesbog, Oct. 21, 1914, on bog grass. (Scammell & Plank) (Canad. Ent. vol. 49, p. 6).

Asterolecanium hemisphaericum Kuwana. Riverton, May 18, on bamboo. Introduced several years ago from Japan and evidently doing well in southern New Jersey. (H. B. Weiss).

Odonaspis secretus Ckll. Riverton, May 18, on *Bambusa metake*. Imported from Japan several years ago and doing well in N. J. (H. B. Weiss).

Phenacaspis nyssae Comst. Milltown, July 22, on sour gum. (Dickerson & Weiss).

Order HEMIPTERA.

Podisus fretus Olsen. New Brunswick, V, 18. (Bull. Brook. Ent. Soc. vol. XI, p. 82).

Stephanitis rhododendri Horv. Should replace *Leptobyrsa explanata* Heid. of the 1909 list according to G. C. Champion in Ent. Mon. Mag. Sept., 1916, p. 207.

Microvelia fontinalis Torre Bueno. Westfield, Sept. 3, 1904. (Torre Bueno). (Bull. Brook. Ent. Soc. vol. XI, p. 58).

Phymata vicina Handl. Madison (Paulmier), Lakehurst, June (Barber). (J. N. Y. E. S. vol. 20, p. 134).

Tenthecoris bicolor Scott. Occasionally found in greenhouses feeding on Cattleya orchids. (H. B. Weiss).

Paracalocoris scrupeus var. *diops* McAtee, Lakehurst, VI-30 (W. T. Davis); var. *bidens* McA., Lakehurst, VI-30, Singac, VI-15; Ramsey, VI-23 (W. T. Davis). (Ann. Ent. Soc. Amer. vol. IX, No. 4).

Paracalocoris colon var. *colonus* McAtee. Lake Hopatcong, VII-4 (W. T. Davis). Trenton (A. E. S. A. vol. IX, No. 4).

Paracalocoris adustus McAtee. Lakehurst, VI-13 (W. T. Davis). (A. E. S. A. vol. IX, No. 4).

Order ORTHOPTERA.

- Blaberus discoidalis** Serv. Rutherford, Secaucus, in greenhouses.
Introduced from South America. (H. B. Weiss).
Conocephalus crepitans Scudder. Erma, August, 1910 (W. T. Davis). (Jour. N. Y. Ent. Soc. vol. 21, p. 178).
Conocephalus melanorhinus R. & H. Tuckerton, Sept. 1, 1907 (W. T. Davis). (Jour. N. Y. Ent. Soc. vol. 21, p. 177).
Diestrammena marmorata Haan. In greenhouses in New Jersey (H. B. Weiss).

Order COLEOPTERA.

- Calosoma sycophanta** L. Ramsey (Sleight). (Jour. N. Y. Ent. Soc. vol. 20, p. 205).
Elaphrus cicatricosus Lec. Ft. Lee (Schaeffer). (Jour. N. Y. Ent. Soc. vol. 20, p. 74).
Bembidium postfasciatum Ham. Little Falls, VI, 6, by washing banks. (A. S. Nicolay).
Sphaeridium bipustulatum Fabr. Upper Montclair (Nicolay), Hackensack Meadows (Wintersteiner). (Jour. N. Y. Ent. Soc. vol. 20, p. 68).
Atheta castanoptera Man. Little Falls (Nicolay).
Stilicus rufis Lec. Lakewood, April 5. Found while sifting leaves around lake. (A. S. Nicolay).
Cathartus longulus Blatch. Upper Montclair, May 29, under stone. (Nicolay).
Hister fungicola Schaeffer. Jamesburg. (Brook. Bull. vol. 8, p. 27).
Atomaria laetula Lec. of 1909 list should be replaced by **A. distincta** Casey. (Schaeffer).
Dermestes pulcher. South Amboy (Schott). (Jour. N. Y. Ent. Soc. vol. 24, p. 309).
Hetaerius blanchardi Lec. Upper Montclair, May 29, a pair in an ant's nest under a stone. (A. S. Nicolay).
Microrhagus audax Horn. Ft. Lee, July 26 (Schaeffer). (Jour. N. Y. Ent. Soc. vol. 24, p. 167).
Microrhagus imperfectus Lec. Ft. Lee (Schaeffer). (Jour. N. Y. Ent. Soc. vol. 24, p. 167).
Cardiophorus erythropus Er. At Highlands (Schaeffer). (Jour. N. Y. Ent. Soc. vol. 24, p. 167).
Elater pedalis should replace **E. luctuosus** of 1909 list (Schaeffer). (Jour. N. Y. Ent. Soc. vol. 24, p. 167).
Melanotus opacocollis Lec. Lakehurst, August (Schaeffer). (Jour. N. Y. Ent. Soc. vol. 24, p. 167).
Corymbites atropurpureus Melsch. Paterson, May 3 (Doll). (Jour. N. Y. Ent. Soc. vol. 24, p. 167).
Corymbites copei Horn. Lakehurst (Schaeffer). (Jour. N. Y. Ent. Soc. vol. 24, p. 167).

- Throscus carinicollis** Schaeffer. New Jersey (Bull. Brook. Ent. Soc. vol. 11, p. 68).
- Melyrodes cibrata** Lec. Ft. Lee, May 23 (Woodruff & Davis) on blackberry blossoms. (Jour. N. Y. Ent. Soc. vol. 24, p. 154).
- Anthocomus erichsoni** Lec. Lakehurst, July 9 (Woodruff & Davis). (Jour. N. Y. Ent. Soc. vol. 24, p. 154).
- Attalus melanopterus** Er. Lakehurst, June 17 (Woodruff & Davis). (Jour. N. Y. Ent. Soc. vol. 24, p. 154).
- Diplotaxis tristis** Kirby. Palisades, May 6 (A. S. Nicolay).
- Mordellistena smithii** Drury. Jamesburg, July 3 (W. T. Davis).
- Corphyra labiata** Say. Passaic, common in grass (A. S. Nicolay).
- Rhinomacer pallipennis** Blatch. New Jersey (Leng). (Rhyn. of N. E. A. by Blatchley & Leng, p. 51).
- Auletes albovestita** Blatch. Orange Mountains, Anglesea, Brigantine Beach. April to August on bayberry (*Myrica cerifera* L.), also on foliage of leather leaf (*Chamaedaphne calyculata* L.). (Rhyn. of N. E. Amer.). This species replaces *cassandrae* Lec., of 1909 list.
- Cholus cattleyae** Champ. In an orchid house at Secaucus feeding on and breeding in the pseudo-bulbs of *Cattleya gigas*. Introduced from Tropical America. (H. B. Weiss).
- Cholus forbesii** Pasc. Found with the above species. (H. B. Weiss).
- Anthonomus atomarius** Blatch. Ocean County, swept from oak shrubs (Leng). (Rhyn. of N. E. Amer. p. 290).
- Anthonomus likensis** Blatch. Orange, June, by beating honey locust (Leng.). (Rhyn. of N. E. Amer. p. 30).
- Thysanocnemis balaninoides** Schaeffer. New Jersey. (Rhyn. of N. E. Amer. p. 242).
- Thysanocnemis bischoffi** Blatch. Bloomsbury (Bischoff). (Rhyn. N. E. Amer. p. 241).
- Tychius picrostris** Fab. Palisades, May 23; Upper Montclair, May 29 (A. S. Nicolay).
- Ceutorhynchus neglectus** Blatch. Chester, Hemlock Falls (Rhyn. N. E. Amer. p. 447). This species replaces *pusio* Mann of 1909 list.
- Diorymellus laevimargo** Champ. In orchid houses in New Jersey. Beetles feed on leaves and flowers of *Cattleya* and *Dendrobium* spp. (Weiss).
- Acypotheus orchivora** Blackb. In orchid houses in New Jersey, breeding in pseudo-bulbs of *Dendrobium* spp. and feeding on various parts of the plants. (H. B. Weiss).
- Tricrania sanguinipennis** Say. Lahaway, April 14, 1916. (R. P. Dow).

Order LEPIDOPTERA.

- Hesperia montivagus** Reak. August, on clover, Passaic Park, 1899 (rare). (M. H. Mead).
- Eutolyte bombyciformis** Sm. Union County, April (F. Lemmer).
- Anytus teltowa** Sm. Elizabeth, September 2, September 20; Lakehurst, September 27; Vineland, August 29. (*Psyche*, 1910).
- Arzama (Bellura) brehmei** Br. and McD. Cliffwood, May 15. (H. H. Brehme).
- Nannia refusata** Wlk. Hopatcong, July 20 (F. Lemmer).
- Alcis sulphuraria** Pack. Hopatcong, July 20 (F. Lemmer).
- Brephos infans** Moesch. Hemlock Falls, April (Watson and Comstock); Jamesburg, April 23 (Watson). Larva on white birch. (*Jour. N. Y. Ent. Soc.* vol. 20, p. 218).
- Nymphula obscuralis** Grt. Passaic Park, July 29, August 15, September 1 (M. H. Mead).
- Achroia grisella** Fabr. The lesser wax-moth. New Egypt and other parts of the State. Not numerous. (E. G. Carr).
- Tortrix georgiella** Walk. Whitesbog, June 10, 1915. Bred from larva on blueberry, *Vaccinium corymbosum*. (H. B. Scammell).
- Holocera elyella** Dietz. Essex County (Kearfoot). (*T. A. Ent. Soc.* vol. 36, p. 50).
- Phuphena u-album** Guen. Lakewood, October 1, 1914. Bred from pupa taken from soil of cranberry bog. (H. K. Plank).
- Ectoedemia populella** Busck. West Norwood, August 15, 1916 (H. B. Weiss). Gall on petiole at base of leaf of *Populus tremuloides*.

Order HYMENOPTERA.

- Diprion simile** Hartig. Rutherford, South Orange, Elizabeth, July 22. Larvae on pine (Dickerson & Weiss). An European species which has become established in New Jersey.
- Janus abbreviatus** Say. Bound Brook, Rutherford, Irvington, Elizabeth, Secaucus, South Orange, Springfield. Larvae in poplar and willow shoots. (Dickerson and Weiss).
- Andricus brevicornis** Beut. Lakehurst. (*T. A. Ent. Soc.* vol. 39, p. 245).
- Meteorus trachynotus** Vier. Whitesbog, August 2. Parasitic on *Ancylis comptana* Froehl. (H. B. Scammell).
- Cremastus minor** Cush. Whitesbog, August, 1915. Bred from *Rhopobota vacciniana* Pack. (H. B. Scammell).
- Cremastus forbesii** Weed. Pemberton, May, 1915. Bred from *Glechia trialbamaculella* Cham.; Whitesbog, August, 1915. Bred from *Rhopobota vacciniana* Pack. (H. B. Scammell).
- Sesioplex validus** Cress. Pemberton, August, 1915. Bred from *Hyphantria cunea* Dru. (H. B. Scammell).

- Sympiesis aencylae** Girault. Whitesbog, July, 1916. (H. B. Scammell).
- Eulophus magnisulcatus** Girault. Jamesburg, reared from a cherry "Coleophor." (Ent. News, vol. 27, p. 404).
- Arthrolytus aeneoviridis** Girault. Whitesbog, July, 1916. (H. B. Scammell).
- Monodontomerus dentipes** Boh. Bred from cocoons of *Diprion simile*. (Weiss.)
- Coelopisthia rotundiventris** Gir. Bred from pupae of *Plagiodes versicolora*. Irvington. (E. L. Dickerson).
- Pleurotropis tarsalis** Ash. Bred from pupa of *Plagiodes versicolora*. Irvington. (E. L. Dickerson).
- Lasius murphyi** Forel. Female at Chester, August 2. (E. L. Dickerson).
- Vespa austriaca** Pank. Ft. Lee, July 16 (Bequaert); Staten Island, July 16. (Hine).
- Halictus florianus caesareus** Ckll. Ocean Grove, July 12. (Bull. Brook. Ent. Soc. vol. 11, p. 11).
- Halictus oceanicus** Ckll. Ocean Grove, July 12. (Bull. Brook. Ent. Soc. vol. 11, p. 11).
- Bombus ternarius** Say. Lake Marcia (High Point). (F. E. Lutz).
- Bombus terricola** Kirby. Ramsey. (F. E. Lutz).

Order DIPTERA.

- Culex brehmei** Knab. Laurence Harbor, April 30, May 17. (H. H. Brehme). (Proc. Biol. Soc. Wash. vol. 29, p. 161).
- Lestodiplosis platanifolia**. Larvae on under sides of plane tree leaves. Rutherford, Elizabeth, Trenton, Riverton, August 15. (E. L. D. and H. B. W.).
- Parallelodiplosis cattleyae** Moll. Madison, Secaucus, in greenhouses where orchids are grown. Larva makes gall near tip of root. (H. B. Weiss).
- Dasyneura communis** Felt. Ridgewood, August 13, galls on ribs of leaves of *Acer rubrum* and *A. saccharinum*. (E. L. Dickerson).
- Simulium jenningsi** Malloch. Lahaway, May 30. (R. P. Dow).
- Promachus rufipes** Fabr. Cedar Springs (Hebard), August 26. (Ent. News, vol. 27, p. 381).
- Hydrophorus intentus** Ald. Atlantic City, May 6. (C. W. Johnson). (Psyche, vol. 18, p. 51).
- Zodion intermedium** Banks. Clementon, May, July. (C. W. Greene). (Annals E. Soc. Amer. vol. 9, p. 193).
- Neopales tortricis** Coq. Parasitic on *Peronea minuta* Rob. Browns Mills, August, 1914. (H. B. Scammell and H. K. Plank).
- Sarcophaga pachyprocta** Parker. New Jersey. (Jour. N. Y. Ent. Soc. vol. 24, p. 171).
- Chrysomyia concolor** Malloch. Lahaway, May 30. (R. P. Dow).

- Mosillus tibialis* Cress. Wildwood, July 18, 1908. (E. T. Cresson, Jr.). (Ent. News, vol. 27, p. 149).
- Drosophila affinis* Sturt. New Jersey. (Ann. Ent. Soc. Amer. vol. 9, p. 334).
- Drosophila putrida* Sturt. New Jersey. (Ann. Ent. Soc. Amer. vol. 9, p. 339).
- Drosophila dimidiata* Loew. Alpine, July 25; Riverton, September 8. (E. L. Dickerson).
- Phytomyza affinis* Fall. Springfield, Orange, Nutley, Rutherford, Elizabeth, Riverton, June. Larva mines leaves of clematis. (H. B. Weiss).
- Phytomyza ilicicola* Loew. Pemberton. Mined leaves of inkberry collected February 23 and adults issued in late April and May. (H. B. Scammell).
- Phytomyza aquilegiae* Hardy. Rutherford, Springfield, Riverton, Elizabeth, June to September. Larva mines leaves of columbine. (H. B. Weiss).
- Aulacigaster ruvitarsis* Macq. Morristown, June 17. (E. L. Dickerson).

Studies in the Tenebrionid Tribe Eleodiini, No. 2 (Coleop.)*

By F. E. BLAISDELL, SR., San Francisco, California.

The following descriptions of new species and races have been in manuscript for a number of years. Nearly all of them have been distributed under the manuscript names, and it now becomes very imperative that they be published without delay.

Eleodes manni n. sp.

Elongate oblong-oval to ovate (some ♀♀), subasperate and moderately convex, surface feebly shining.

Head twice as wide as long, scarcely convex, feebly impressed just within the prominent frontal margins; frontal suture more or less evident as a glabrous line, sometimes impressed; surface rather coarsely and more or less irregularly punctate, punctures denser laterally and on the epistoma, vertex more finely punctured; antennae long, reaching slightly beyond the pronotal base, outer four joints moderately compressed and feebly dilated, third joint quite equal in length to the fourth and fifth combined, fourth, fifth, sixth and seventh joints subequal in length and obconical, eighth obconico-triangular, ninth and tenth suborbicular in outline, eleventh obovate and obliquely truncate at tip.

*Studies No. 1 was published in the NEWS for February, 1910, vol. xxi, pp. 60-67.

Pronotum widest at the middle, about one-fourth wider than long, about twice as wide as the head in the female, and less than twice as wide in the male; disk very moderately and evenly convex, somewhat densely and irregularly punctate, punctures rather coarse, somewhat denser laterally and not noticeably granulate nor with the surface depressed, not declivous at the angles; apex very feebly emarginate in circular arc, very finely to sub-obsoletely marginated; sides broadly, evenly and moderately arcuate to the basal twelfth, there briefly sinuate with the sides parallel to the basal angles, margin entire and finely beaded; base quite truncate and distinctly marginated, slightly wider than the apex; apical angles not in the least prominent and very feebly rounded; basal angles small and rectangular.

Propleurae very sparsely muricato-granulate and obsoletely rugulose.

Elytra oval, widest at the middle; base truncate and not in the least adapted to the pronotal base, equal in width to the same; humeri obsolescent; sides evenly arcuate, apex somewhat narrowed and rather broadly rounded; disk feebly convex on the dorsum, rather broadly and quite evenly rounded laterally, obliquely declivous posteriorly; surface rather closely and moderately coarsely punctate, punctures somewhat corroded and scarcely asperate centrally along the suture, there subserially arranged, the interstitial punctures more distantly spaced than the closely-placed strial punctures; laterally and apically the punctures are more confused and distinctly muricate.

Epipleurae moderately narrow, gradually narrowing from base to apex, superior margin very slightly curving upward at the base; surface dull, concave in basal one-half and sparsely subasperately punctate.

Sterna finely and densely punctate, punctures setigerous and the surface not noticeably rugulose.

Parapleurae rather coarsely punctate.

Abdomen horizontal, somewhat shining, moderately finely punctate and obsoletely rugulose.

Legs moderate in length, not stout. Profemora mutic; tibial spurs similar and the tarsi dissimilar in the sexes. Plantar spinules ferruginous.

♂. Elongate, narrow, three times as long as wide. Antennae extending about three joints beyond the pronotal base. Elytra as a rule scarcely wider than the pronotum, moderately convex. First two abdominal segments flattened at the middle, the intercoxal process more or less concave. First two joints of the protarsi not noticeably thickened beneath, but clothed with large pads of yellow silken pubescence; surfaces of the pads flat and subpatellate; the marginal and apico-marginal spinules rather long, silky, the latter longer and acute; plantar grooves distinct on the third and fourth joints. First two joints of the mesotarsi with silken-pubescent on the apical half of

each, plantar grooves nearly obliterated, especially on the first joint.

♂. Oval to ovate, more robust, about twice as long as wide. Antennae extending about one joint beyond the pronotal base, the latter one-twelfth of its width wider than the apex. Abdomen rather strongly convex. First joint of the protarsi slightly thicker beneath than the second, plantar grooves entire.

Measurements.—Males: Length 15.0-15.2 mm.; width 5.0-6.5 mm. Females: Length 13.5-16.0 mm.; width 6.8-7.0 mm.

Habitat.—Washington (Wawawai, March 20th, April 24th and May 1st, 1909; Ellensburg, March 13th, 1909; Almota, May 17th).

Manni belongs to the subgenus *Blapylis*.

Types (♂ and ♀) in my own collection. Paratypes in Mr. Wm. Mann's collection, to whom the species is dedicated.

Eleodes variolosa n. var. (A new race of *manni*.)

Oblong, elongate, more or less shining, subglabrous. Elytra very coarsely punctate on the disk, the punctures coalescing transversely; laterally and on the apex muricato-rugose, the small muricate tubercles coalescing transversely; intervals somewhat convex; humeri obtuse to obsolete.

Head coarsely, sparsely and irregularly punctate, the punctures crowded laterally and on the epistoma, very feebly convex, impressed laterally and along the pronotal suture. Antennae reaching a little beyond the pronotal base, moderately stout, slightly compressed in the outer four joints and not dilated, third joint a little longer than the fourth and fifth taken together; joints 4-7 inclusive subequal in length and thickness, scarcely obconical, subcylindrical; eighth triangulo-obconical, ninth subtriangular, tenth and eleventh subtrapezoidal, about as long as wide, the latter truncately obovate.

Pronotum widest at the middle and wider than long; disk moderately convex coarsely, irregularly and rather densely punctate, more densely and subgranulately so along the margins at the sides, punctures subequal in size, intervals flat and forming small impunctate areas here and there; apex very feebly emarginate and obsoletely margined; sides evenly arcuate, feebly and not suddenly sinuate in basal seventh, scarcely parallel before the angles; base truncate and finely margined; apical angles obtuse and not at all prominent; basal angles subrectangular and not in the least prominent.

Propleurae opaque, sparsely and very irregularly punctato-granulate, subrugulose about the acetabula.

Elytra oblong-oval to ovate, widest at the middle, base wider than the contiguous pronotal base; humeri obtuse to obsolete; sides evenly arcuate from base to apex, the latter broadly rounded; disk moderately

convex and broadly arcuately rounded laterally, arcuately declivous posteriorly; surface rather coarsely and not densely sculptured, centrally the punctures are coarse, shallow and somewhat eroded, tending to coalesce transversely, laterally and apically muricato-granulate, the rather large granules coalescing transversely so as to appear rugose.

Epipleurae opaque, finely, sparsely and subasperately punctulate, gradually narrowing from base to apex; superior margin scarcely sinuate beneath the humeri.

Sterna and *parapleurae* finely and not densely punctate nor asperate.

Abdomen rather finely and sparsely punctate, more coarsely and rugosely so on the first segment, fourth segment with comparatively few punctures.

Legs rather stout, moderate in length. Profemora mutic. Tarsi dissimilar in the sexes.

♂. Somewhat narrow. Elytra oblong; abdomen less convex, somewhat flattened on the first two segments, and feebly oblique to the sterna.

Protarsi with a blunt tuft of golden pubescence on the first joint at apex beneath; mesotarsi without tufts of pubescence.

♀. Somewhat stout. Elytra less oblong and more oval. Abdomen moderately convex and horizontal, i. e., on the same plane with the sterna. First joint of the protarsi thickened beneath.

Measurements. Male.—Length, 12.0 mm.; width 5.0 mm. Female.—Length, 11.5 mm.; width, 6.0 mm.

Habitat.—Washington (Wenatchee, May 8th; Ellensburg, March 13th) collected by Wm. Mann. Number of specimens studied, 3 (2 ♂ ♂, 1 ♀).

Types (♂ and ♀) in my own collection. *Paratype* (♂) in Mr. Mann's collection.

Eleodes adulterina n. var. (A race of *cordata* Esch.)

Syn. *forma intermedia*. See Bull. 63, U. S. Nat. Mus., p. 381.)

The name *intermedia* is preoccupied. This race of *cordata* Esch. was briefly defined as *E. cordata forma intermedia* in the above monograph of the Eleodiini as follows: "Sculpturing more strongly muricato-tuberculate, with the intervals between the punctures less convex and consequently less rugose, approaching *pimelioides* Mann." On the central area of the elytral disk along the suture the punctures become less muricate and simpler.

A series of 209 specimens collected by Mr. F. W. Nunen-

macher, in Eldorado, Plumas, Del Norte, Humboldt, Placer, Monterey, Shasta and Lake Counties, California, demonstrates very clearly that *adulterina* is the prevailing race of *cordata*. The specimens collected in Del Norte County are on the average smaller than those collected elsewhere, otherwise they are true *adulterina*. The above series is augmented by 156 specimens taken in Tuolumne and Mariposa Counties.

Eleodes hybrida n. var. (A race of *cordata* Esch.)

Prothorax as in *cordata*, except that the pronotal intervals are flat and more or less alutaceous. The punctures are rather abruptly defined, more or less coalescent and irregularly placed, leaving small and impunctate areas on the central part of the disk. The moderately deep punctures give the intervals the appearance of being raised, although not in the least rugose.

Measurements. Males—Length, 12.5-13.0 mm.; width 5.5 mm. Female—Length, 12.5-13.0 mm.; width, 6.0-6.5 mm.

Types in my own collection. Type locality, Plumas County.

Habitat.—Plumas and Lake Counties. F. W. Nunenmacher, collector. Number of specimens studied, 55.

In *adulterina* the prothoracic intervals are rugose as in *cordata* and the punctures finer. The first two joints of the protarsi at tips beneath, bear moderate tufts of piceo-flavate pubescence, and the first joint of the mesotarsi has a small transverse submarginal tuft at tip (♂).

Eleodes trita n. var. (A race of *parvicollis* Esch.)

Opaque, sculpturing eroded, oblong-ovate. Thorax somewhat transverse. Elytra depressed, humeri prominent and obtusely rounded.

Head and antennae as in *producta* Mann. Pronotum less transverse and less arcuate behind the middle than in *producta*; disk moderately convex, more or less slightly impressed laterally, rather coarsely and somewhat densely punctate, punctures shallow and eroded, denser and finely granulate along the lateral margin, the summits of the granules bright and shining; apex, sides, base and angles as in *producta*. Propleurae sparsely granulato-punctate and more or less rugulose.

Elytra about twice as long as wide, less elongate than in *producta*; base truncate, distinctly wider than the base of the pronotum; sides more or less arcuate and subparallel, becoming arcuately and somewhat convergent in apical third, apex rather broadly rounded; disk distinctly flattened at base, thence more or less evenly convex, rather obliquely and somewhat rapidly declivous posteriorly, arcuately rounded

at the sides; surface scarcely densely punctate, punctures rather coarse and eroded, irregular but exhibiting a feeble lineate arrangement, subequal in size throughout, about the humeri and along the arcuately declivous sides granulate, granules distinct, bright and shining.

Epipleurae obsoletely and very sparsely punctate.

Sterna.—Prosternum densely punctate, more or less longitudinally grooved between the coxae, feebly mucronate at tip. Meso- and metasterna densely punctate.

Abdomen densely and not very finely punctate on segments 1 and 2, third and fourth less so at middle and along the base, fifth more or less impunctate; glabrous and shining at middle to base.

Legs less stout than in *producta*.

♂. Slightly more oblong, scarcely more depressed than the female. Abdomen slightly flattened at middle of the first two segments and feebly oblique. First two joints of the protarsi moderately thickened at tip beneath and there clothed with rather long flavate pubescence; tuft of the first joint larger than that of the second, both obliterating the plantar groove; third joint without evidence of increased pubescence, spinose on the margins of the groove, the latter smooth and shining. First joint of the mesotarsi also has a small tuft at tip.

♀. More or less oblong-ovate, somewhat broader. Abdomen more convex at base.

Measurements. Males.—Length, 11.0-16.0 mm.; width 5.0-6.4 mm. Females—Length, 12.0-13.0 mm.; width, 5.5-6.0 mm.

Habitat.—Oregon (Josephine County, June 8th). California (Humboldt County, Del Norte County).

Described from a series of 23 specimens.

Types in my own collection. Collected by Mr. F. W. Nunenmacher, who possesses paratypes.

Type locality.—Del Norte County, California.

Trita may have been distributed as *forma opaca*. Compared with a newly collected series of 42 specimens of *producta* Mann., and 280 specimens of *constricta* LeC., all collected by Mr. Nunenmacher on the same trip.

Eleodes papillosa n. sp.

Syn. *granulata forma tuberculata*.

During the summer of 1913, Dr. E. C. Van Dyke and Mr. L. R. Reynolds collected typical *Eleodes granulata* LeC. at Carville, Trinity County, California. When the monograph of the Eleodiini (Bull. 63, U. S. Nat. Mus.) was written no specimens of typical *granulata* had been seen, and the author was

doubtful as to the status of the present species, which was defined as follows: "Thorax as in *aspera* LeC., elytra with the humeri subacute; disk sculptured with distinct tubercles, which usually show a serial arrangement, alternate series larger and not at all rugose."

Habitat.—California (Siskiyou County, collections U. S. National Museum).

Papillosa is larger and more robust than *granulata*, and usually of an intense black and feebly shining. The pronotal punctuation is like that of *Upis cerambooides*, only that the punctures are distinctly separated and not coalescent. The elytral tuberculation is almost like that observed in *granosa*. (See p. 131, Bull. 63, U. S. Nat. Mus.)

Key to the Nearctic Species of *Gargaphia* with the Description of a New Species (Hem., Heter.)

By CARL J. DRAKE, Ohio State University, Columbus, Ohio.

The genus *Gargaphia* Stål is represented by five described Nearctic species and a new one is added herein. The genus can readily be separated from the other genera of the Tingidae by the transverse, sinuous carina which interrupts the rostral sulcus between the meso- and metasternum.

Key to the Nearctic Species of Gargaphia.

- | | |
|--|--------------------------|
| 1—Elytra broad, costal area with four or more rows of areolae at its widest part | 2 |
| Elytra narrower, costal area with not more than three rows of areolae at its widest part | 4 |
| 2—Lateral membranous pronotal margins widely expanded, with five or more rows of areolae at its widest part; first segment of the antennae blackish | <i>G. solani</i> Heid. |
| Lateral membranous pronotal margins narrower, with not more than four rows of areolae at its widest part; first segment of the antennae testaceous | 3 |
| 3—Size small (less than 3.5 mm.); membranous pronotal margins angularly expanded about the middle | <i>G. angulata</i> Heid. |
| Size larger (more than 4 mm.); membranous pronotal margins rounded | <i>G. tiliæ</i> Walsh. |
| 4—Costal area of the elytra narrow, with not more than two rows of areolae at its widest part; membranous pronotal margins very narrow, strongly reflected, and forming an acute angle with the thorax | <i>G. opacula</i> Uhler. |

- Costal area of the elytra with three rows of areolae at its widest part; membranous pronotal margins broader, not so strongly reflected and forming an obtuse angle with the thorax.....³
5—Costal area of the elytra with two complete and a partial series of areolae; nervures of elytra and membranous pronotal margins not of a uniform color, the areolae more or less iridescent,

G. iridescens Champ.

- Costal area of the elytra with three complete series of areolae; nervures of the elytra and membranous pronotal margins concolorous, the areolae hyaline.....⁴*G. albescens* n. sp.

Gargaphia albescens spec. nov.

Head armed with five rather short spines. Antennae slender, moderately long, beset with a few short hairs; first segment rather short, about twice the length of the second; fourth segment longer than the first and second conjoined.

Lateral membranous pronotal margins moderately broad, angularly dilated about the middle, composed of two quite regular rows of areolae and in some specimens with two or three extra cells at the angle. Hood moderately large. Pronotum punctate, tricarinate; carinae moderately hairy, composed of a single series of areolae. Rostral sulcus deep, the rostrum almost reaching the transverse, sinuous carina. Hood, membranous pronotal margins, and elytra beset with a few short, very fine hairs.

Elytra moderately broad, reaching considerably beyond the apex of the abdomen; costal area composed of three quite regular series of areolae. Wings a little longer than the abdomen.

Claspers in the male large and strongly curved.

Length (♂ and ♀), 3 mm.; width, 1.3 mm.

Color. General color white. Head, thorax and abdomen black (in one specimen the thorax and abdomen beneath are brownish-black). Antennae: first segment black, second and fourth (except base) segments blackish, third segment and base of fourth dirty white. Legs dirty white, the tips of tarsi and nails embrowned. Nervures of hood, membranous pronotal margins, posterior triangular process of pronotum, and elytra white; areolae hyaline. Nervures of carinae white, except a few of the transverse nervures embrowned. Wings iridescent. Bucculae, rostral sulcus, and transverse carina broadly margined with white. Claspers in the male embrowned.

Four specimens, taken at Sacramento, California, by Mr. D. J. Condit. *Type* in my collection: *paratype* in the collection of Prof. J. G. Sanders. This species can readily be separated from allied forms by the characters given in the key. It is most closely related to *angulata* and *iridescens*.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., MAY, 1917.

Entomology as a National Defense.

Dr. L. O. Howard, Chief of the Bureau of Entomology, United States Department of Agriculture, writes:

It is unnecessary to call attention to the important work which the entomologists of the country can do in the present crisis in the way of increasing crop production by the control of injurious insects. The Bureau of Entomology is organizing its forces to bring before the country at large essential information of this character through brief publications and through the activities of men at various field stations. While no part of the field should be neglected, it is felt that special attention should be given to insect outbreaks involving staple crops, and to the preservation of stored grain, forage, etc. Probably in some instances it will be feasible to reduce infestation or spread by prompt measures. For this reason the entomological service of the United States as a whole should be on the lookout for unusual insect conditions, and where concerted action is essential, such co-operation should be arranged at the first possible moment.

The Bureau of Entomology wishes greatly to increase its reporting service on insect pests. We will have the co-operation of the crop reporters and farm demonstrators throughout the country and would like to have also the co-operation of all State and Station Entomologists. This service will be conducted with headquarters at Washington and it is hoped that all those assisting will keep the central office in constant touch with the status of insect pests in their vicinity. With these data in hand the central office will be able to tabulate and map the occurrence of all injurious pests and to indicate to the men in the field the sections which are threatened with insect damage and the means for combating same. With this information it will be possible to conduct a vigorous campaign against threatening pests.

The Bureau stands ready to assist State and Station Entomologists whenever it is possible to do so.

Dr. E. P. Felt, State Entomologist of New York and Editor of the *Journal of Economic Entomology*, writes:

Our country has entered a gigantic struggle in which material assets of many kinds play a most important part. There

is urgent need for the conservation and development of all resources—life, health, food—to designate a few having a close relation to applied entomology. An army or navy can accomplish little without the foregoing essentials. There are many openings for the economic entomologist to demonstrate the utility of his calling. The urgent need of better camp sanitation, so far as insects are concerned, warrants an entomological staff attached to every large camp and hospital center and associated with the medical or sanitary corps in handling insect problems, particularly flies and other disease carriers, though body parasites and animal pests should not be ignored. These men should have a rank which would give weight to their recommendations, resources which would permit intensive studies of the entire problem if necessary, and facilities for the practical application of results to field and camp conditions. The work in the various localities should be co-ordinated and directed by a supervising entomologist in order to insure the greatest efficiency.

It is very far from my idea to criticize directly or indirectly the administration by army officials of sanitary matters in relation to insect control in camps, and yet it seems to me there is a great opportunity for the practical entomologists to render an invaluable service to the country, through co-operation and the placing at the disposal of the sanitarians, preferably working with them rather than simply advising, of knowledge which we have gained through the experience not only with flies and other insects occurring, or likely to occur, in camps, but also that gained from a study of other forms of insect life and which may be of service in solving problems of pressing importance.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Mr. E. B. Williamson's Collecting Trip in Colombia.

From an article in the Bluffton, Indiana, *Daily News*, of March 15, 1917, we learn that Mr. E. B. Williamson returned to his home in that town on March 14. He was accompanied by his cousin Mr. Jesse Williamson. He left Bluffton on November 25, 1916, was joined by his cousin at Colon, Panama, December 5 and, after two days in the Canal Zone, touched at Cartagena, Colombia, December 8, at Porto Colombia December 9, and made Santa Marta on December 12. In this region they collected December 13-January 13. Leaving Baranquilla December 18, they proceeded up the Magdalena River 600 miles as far as the lower Magdalena is navigable. They then went by train to Mariquita, only 100 miles from Bogota, their nearest approach to that city. Collecting was done near the river on the up voyage, and

on the descent at Cisneros and Cristalina, the latter being an especially favorable locality. Leaving Santa Marta February 28, they returned to Bluffton via Cristobal (C. Z.), Bocas del Toro, Havana and New Orleans. They brought back 8560 specimens of dragonflies and about 500 miscellaneous insects.

The Destruction of the House Fly.

The Merchants' Association of New York, through its Committee on Pollution and Sewerage, has issued a circular in regard to the common house fly, in the belief that the health and welfare of the community is of vital interest to all, and that any suggestion for the eradication of this dangerous and annoying household pest will be appreciated by every one. It also suggests that the attention of the pastors of churches be called to the desirability of teaching their people the iniquities of the house fly. "Furthermore, school trustees and teachers would find it instructive and interesting to emphasize the importance of this matter in talks to the pupils on the subject. There are a number of authorities who believe that the germ or virus of infantile paralysis is disseminated by the fly and all efforts should be directed to prevent a recurrence of last year's dread experience by this agency." The association has its offices at 233 Broadway, New York.

Notice to the Zoological Profession of a Possible Suspension of the International Rules of Zoological Nomenclature in the Cases of *Musca* Linnaeus, 1758, and *Calliphora* Desvoidy, 1830. (Dipt.).

In accordance with the Rules of the International Zoological Congress, the attention of the zoological profession is invited to the fact that Dr. L. O. Howard, W. Dwight Pierce, and 21 other professional zoologists have requested the International Commission on Zoological Nomenclature to exercise its Plenary Power in the case of the Linnaean genus *Musca* 1758, and, under suspension of the Rules, to declare *M. domestica* as type of this genus, also, under suspension of the Rules, to validate *Calliphora* Desvoidy, 1830, with *C. vomitoria* as type.

The request is based on the grounds of practical utility, and an almost unbroken history of consistent usage since 1758 in the case of *Musca*, and since 1830 in the case of *Calliphora*. It is claimed that a strict application of the Rules will produce greater confusion than uniformity.

According to the premises at present before the Commission, if the Rules are strictly applied, the generic name of *Musca* would take either *M. caesar* or *M. vomitoria* as type, and the species *M. domestica* would be cited either in *Conostoma* 1801 [?] (type *Iscaris conostoma* = larva of *M. domestica*) or in *Promusca* 1915 (type *M. domestica*), thus resulting in a very regrettable change in the nomenclature of the species in question as almost universally used in entomological, zoological, medical, epidemiological and veterinary literature.

The Secretary of the Commission invites any person interested in these cases of nomenclature to communicate his opinion on the subject as soon as possible, and not later than May 1, 1918, when the subject will be submitted to the Commission for vote.—C. W. STILES, Secretary to Commission, 25th & E. Streets, N. W., Washington, D. C.

Pupal Differences in *Megathymus* (Lep.).

Mr. J. G. Bonniwell, who has collected the pupae of *Megathymus yuccae* and *cofaqui*, has recently sent me specimens of the pupal tubes of both species and also the empty pupal shells. There is a marked difference in the silk tubes from which the imagos emerged, both in size and in color. When cut open and measured across, that of *yuccae* is 45 mm., and that of *cofaqui* 34 mm. The outer sides of these pouches, tubes or nests are covered by what appears to be the plant fibre chewed up by the larvae and is rather fine and disintegrated.

In the case of *M. yuccae* it is of dark gray color and in *M. cofaqui* it is yellowish brown. In these two specimens the difference in color is marked. The two pupae he sent me also differ in size, that of *yuccae* being 45 mm. long, that of *cofaqui* 40 mm. long, and the former is more robust.

Dr. C. V. Riley in his account of the pupa of *yuccae* describes it as ending in a slightly decurving flap. In the two specimens examined this is approximately twice as wide in *yuccae* as in *cofaqui*. There are probably differential pupal characters in addition, but from only one specimen of each I could not be sure whether they were differential or only individual, or possibly sexual.

Some time ago Dr. D. M. Castle gave me a *yucca* plant that had a borer in it and I was able to rear it to the adult stage and it proved to be *Megathymus yuccae*. The silken pupal tube extended five and one half inches above the ground and the upper end was covered with a certain amount of what appeared to be frass. The whole plant, including the leaves, was fourteen inches high. The type of *cofaqui* is a female and the male was recently described in the Bull. Am. Mus. Nat. Hist., 1917, XXXVII, 36. We have had both sexes for many years. I described *Megathymus stephensi*, a Californian species, as a variety of *neumoegeni* but I now consider it a distinct species, and I think an examination of the genitalia would prove this to be correct.

The genus is an interesting one and the insects far more plentiful in nature than one would think from finding the imagos, which have always been rare in collections.—HENRY SKINNER.

Synonymic Notes on North American Lepidoptera.

Thanaos callidus Grinnell.

In our *Contributions* (Vol. III, No. 2, pp. 122-3), we suggested that the male and female types of this species were not conspecific, that the female type, after which seemingly most of the identifications had been made, was probably the same species as *lacustra* Wright, but that the male type, which automatically would hold the name, was probably a form close to *persius*. Since then, through the kindness of Mr. Fordyce Grinnell, we have examined the types of *callidus* as well as the single male type of *pernigra* and find that our surmise was correct;

the male types are a form close to *persius* and probably the California representative in the Higher Sierras of the Eastern species; the so-called female type was really a male and belonged to the *briso* group, being the same as that later described by Wright as *lacustra*. *Pernigra* is a very dark form apparently worthy of a name, and quite possibly restricted to Mt. Tamalpais and the San Francisco Bay region; a study of the genitalia will be necessary to show whether it is distinct from *callidus* as a species.

Cerapoda oblita Grt. (syn. *deserta* Grinnell).

The species described as *Autographa deserta* by Grinnell in 1912, (Bull. S. Calif. Acad. Sci., p. 79) proves to be synonymous with *Cerapoda oblita* Grt.; through the kindness of Dr. R. Ottolengui, of New York, and Mr. F. Grinnell, one of the types has been placed in the Barnes Collection.

Genus Animomyia Dyar (syn. *Graefia* Pears.)

This genus was described and doubtfully placed in the *Liparidae* in 1908, (Proc. Ent. Soc. Wash. X, 53), based on the species *morta* Dyar from San Diego, Calif. In 1910, (Can. Ent. XLII, 330), Pearsall erected the genus *Graefia* in the *Geometridae* for the species *smithi* Pears. from Walters Station, Calif. We have before us one of the co-types of *smithi* Pears., received through the kindness of the authorities of the American Museum of Natural History, New York, and have recently received a specimen of *morta* Dyar from Laguna Beach, Calif. The two genera are synonyms without a doubt, in fact the specimens from San Diego, mentioned by Pearsall at the close of his article as being almost worthy of a varietal name, is really *morta* Dyar, which seems to us specifically distinct from *smithi*; the points mentioned by Pearsall, *viz.* smaller size, more hyaline wings and closeness of t. p. line to discal dot easily separate *morta* from *smithi*. The reference to the *Geometridae* near *Coniodes* seems to us to be correct. The synonymy will, therefore, stand:

Animomyia Dyar.

Graefia Pears.

(1) *morta* Dyar.

(2) *smithi* Pears.

J. McDUNNOUGH, Decatur, Illinois.

The Collector's Exchange.

Under this title, Mr. Sidney C. Carpenter, of Hartford, Connecticut, proposes a weekly publication of "Wanted," "For Sale" and "Exchange" notices, "For Sale" and "Exchange" lists, and a classified directory of collectors, specialists and dealers. Those interested may apply to him for a circular giving detailed information.

A Correction. (Col.).

Owing to a mistake in copying the manuscript of the description of *Onus cupreonitens* Blais. & Reyn., the elytra were stated to be one-third longer than wide, which is not the truth. The statement should be corrected to read, (elytra) *about one-half longer than wide*. (Ent. News, Vol. XXVIII, No. 2, p. 50).—FRANK E. BLAISDELL, SR., San Francisco, Calif.

A Correction (Col.).

I note an error in spelling in the manuscript of the first part of my article, appearing in the March number of the News. On page 131, species No. 8. *Trachykele nebulosa* Fall should read "*Trachykele nimbosa* Fall." There is no such species as *T. nebulosa*.—W. J. CHAMBERLIN.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded.

The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new species are all grouped at the end of each Order of which they treat. Unless mentioned in the title, the number of the new species occurring north of Mexico is given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

4—The Canadian Entomologist. **5**—*Psyche*. **8**—The Entomologist's Monthly Magazine, London. **18**—Ottawa Naturalist. **50**—Proceedings of the U. S. National Museum. **68**—Science, New York. **86**—Annales, Societe Entomologique de France, Paris. **87**—Bulletin, Societe Entomologique de France, Paris. **143**—Ohio Journal of Science, Columbus, Ohio. **153**—Bulletin, American Museum of Natural History, New York. **161**—Proceedings, Biological Society of Washington. **179**—Journal of Economic Entomology. **180**—Annals, Entomological Society of America. **184**—Journal of Experimental Zoology, Philadelphia. **272**—Memorias, Real Academia de Ciencias y Artes de Barcelona. **304**—Annals of the Carnegie Museum. **313**—Bulletin of Entomological Research, London. **322**—Journal of Morphology, Philadelphia. **355**—Smithsonian Institution Report, Washington, D. C. **373**—Contributions to the Natural History of the Lepidoptera of North America, by Wm. Barnes & J. H. McDunnough, Decatur, Ill. **394**—Parasitology, Cambridge, England. **438**—Bulletin, Illinois State Laboratory of Natural History, Urbana. **447**—Journal of Agricultural Research, Washington. **531**—Boletin, Direccion de

Estudios Biologicos, Mexico. 540—The Lepidopterist. Official Bulletin, Boston Entomological Club.

GENERAL SUBJECT. Calvert & Calvert—A year of Costa Rican natural history (New York, The Macmillan Co., 1917), 577 pp.—Cockerell, T. D. A.—New tertiary insects, 50, lii, 373-84. Fossil insects, 180, x, 1-22. Criddle, N.—Precipitation in relation to insect prevalence and distribution, 4, 1917, 77-80. Glaser, R. W.—The growth of insect blood cells in vitro, 5, xxiv, 1-7. Goldschmidt, R.—A further contribution to the theory of sex, 184, xx, 593-611. Headlee, T. J.—Some facts relative to the influence of atmospheric humidity on insect metabolism, 179, x, 31-38. Hewitt, C. G.—Insect behaviour as a factor in applied entomology, 179, x, 81-94. McColloch, J. W.—A method for the study of underground insects, 179, x, 183-88. Sjostedt, Y.—Construction of insect nests, 355, 1915, 341-7. Walden, B. H.—Simple apparatus for insect photography, 179, x, 25-30. Walsh, G. B.—On the rarity and restricted distribution of animal—especially insect—species, 8, 1917, 57-61 (cont.). Wilcox, A. M.—Notes on rearing insects for experimental purposes and life-history work, 5, xxiv, 7-12. Winn, A. F.—The insect collections of Canada, 4, 1917, 111-12.

PHYSIOLOGY AND EMBRYOLOGY. Carothers, E. E.—The segregation and recombination of homologous chromosomes as found in two genera of Acrididae (Orthoptera), 322, xxviii, 445-522. Casteel, D. B.—Cytoplasmic inclusions in male germ cells of the fowl tick....., 322, xxviii, 643-84. Hance, R. T.—The somatic mitoses of the mosquito, *Culex pipiens*, 322, xxviii, 579-92. Whiting, P. W.—The chromosomes of the common house mosquito, *Culex pipiens*, 322, xxviii, 523-78.

NEUROPTERA, ETC. Bacot & Hindle.—A contribution to the bionomics of *Pediculus humanus* (*vestimenti*) and *P. capitis*, 394, ix, 228-65. Nuttall, G. H. F.—Studies on *Pediculus*. 1. The copulatory apparatus and....., 394, ix, 293-324. Whitehouse, F. C.—The Odonata of the Red Deer district, Alberta, 4, 1917, 96-103.

Navas, R. P. L.—Neuropteros nuevos o poco conocidos [1 n. sp.], 272, xiii, 155-178.

ORTHOPTERA. DuPonte & Vanderleck.—Studies on *Coccobacillus acridiorum*, and on certain intestinal organisms of locusts, 180, x, 47-62.

HEMIPTERA. Glaser, R. W.—Anthocyanin in *Pterocomma smithiae*, 5, xxiv, 30. Hungerford, H. B.—Notes concerning the food supply of some water bugs, 68, xlvi, 336-7. Maulik, S.—Solvability of the scale of *Lepidosaphes ulmi*, 313, vii, 267-70. Metcalf, Z. P.—The wing venation of the *Cercopidae*, 180, x, 27-34.

Parshley, H. M.—Notes on No. American Tingidae [4 new], 5, xxiv, 13-25. Sanders & DeLong.—The Cicadellidae of Wisconsin, with descriptions of new species [13 new], 180, x, 79-97.

LEPIDOPTERA. Ainslie, C. N.—A few notes on the life history of *Phalonia spartinana*, 4, 1917, 93-6. Ainslie, G. G.—Crambid moths and light, 179, x, 114-23. Collins, C. W.—Methods used in determining wind dispersion of the gipsy moth and some other insects, 179, x, 170-77. Dyar, H. G.—Nomenclature of *Catocala* varieties, 540, i, 31-2. Mabille, P.—Description d'*Hesperides nouveaux*, 87, 1917, 54-60. Murillo, L.—*Mariposa de Guinea* [*Eumaeus debra*], 531, i, 637-40. Saunders, W. E.—European butterfly found at London, Ont. (*Adopea lineola*), 18, xxx, 116.

Barnes & McDunnough.—Further notes on *Philotes battoides* and its allies. Remarks on Grossbeck's list of Florida L. New sps. and vars. of Geometridae [many new], 373, iii, 213-96.

DIPTERA. McColloch, J. W.—Wind as a factor in the dispersion of the hessian fly, 179, x, 162-70. Macdonald, A.—Notes on blood-sucking flies of Grenada, 313, vii, 259-64. Macfie, J. W. S.—Morphological changes observed during the development of the larva of *Stegomyia fasciata*, 313, vii, 297-307. Mote, D. C.—Observations on the distribution of warble flies in Ohio, 143, xvii, 169-176. Richardson, C. H.—The response of the house-fly to certain foods and their fermentation products, 179, x, 102-9. Townsend, C. H. T.—Second paper on Brazilian Muscoidea collected by H. H. Smith, 153, xxxvii, 221-33. Welch, P. S.—Further study on *Hydromyza confuens*, 180, x, 35-46.

Cockerell, T. D. A.—(See under General). Edwards, F. W.—Notes on Culicidae, with descriptions of n. sps., 313, vii, 201-30. Malloch, J. R.—A preliminary classification of D., exclusive of Pupipara, based upon larval and pupal characters, with keys to imagines in certain families. Pt. I. [Many new], 438, xii, 161-407. Townsend, C. H. T.—New genera and sps. of American muscoid D. [13 n. g.; 4 n. sps.], 161, xxx, 43-50. Williston, S. W.—*Camptopelta*, a new genus of Stratiomyidae [1 n. sp.], 180, x, 23-6.

COLEOPTERA. Bugnion, E.—Les parties buccales de *Nacerda melanura*, 86, 1916, 326-36. Desbordes, H.—Synopsis de divers groupes d'Histeridae, 86, 1916, 297-326. Hess, W. N.—The chor-dotonal organs and pleural discs of cerambycid larvae, 180, x, 63-78. Lesne, P.—Notes sur les Philorea, coleopteres Tenebrionides de la fauna des Andes, 87, 1917, 71-2.

Cockerell, T. D. A.—(See under General). Wickham, H. F.—New sps. of fossil beetles from Florissant, Colorado, 50, iii, 463-72.

HYMENOPTERA. Holland, W. J.—List of the H. collected on

the Isle of Pines by G. A. Link, 1912-13, and contained in the Carnegie Museum, 304, xi, 291-96. Urbahns, T. D.—*Tetrastichus bruchophagi*, a recently described parasite of *Bruchophagus funebris*, 447, viii, 277-82. Wheeler, W. M.—The No. American ants described by Asa Fitch, 5, xxiv, 26-9. Zappe, M. P.—Egg-laying habits of *Diprion simile*, 179, x, 188-90.

Cockerell, T. D. A.—(See under General). Girault, A. A.—Two n. gen. of No. American Entedoninae (Chalcid-flies), 4, 1917, 110-11. Howard, L. O.—A new aphis-feeding *Aphelinus*, 161, xxxx, 77-8. Morrison, H.—Monograph of the nearctic H. of the genus *Bracon* [many new], 50, iii, 305-43. Viereck, H. L.—Contributions to our knowledge of the bee genus *Perdita* [1 n. sp.], 153, xxxvii, 241-42. Viereck, H. L., et al.—The H., or wasp-like insects of Connecticut. (Guide to the insects of Connecticut, Part III). (Conn. Geol. & Nat. Hist. Survey, Bul. 22). [many new].

Doings of Societies.

The American Entomological Society.

Meeting of December 11, 1916, in the hall of the Academy of Natural Sciences of Philadelphia; Dr. Henry Skinner, President, in the chair. Nine members and two associates of the Entomological Section of the Academy present. The annual reports were read; 577 additions to the library by gift, exchange, etc., were recorded; new By-Laws had been adopted and copies printed and distributed, and a new agreement with The Academy adopted. The report of the Publication Committee mentioned the completion of Volume XLII of the *Transactions* and the issue of Number 1 of the *Memoirs* of the Society. On motion it was voted that the Society's meetings during 1917 be held on the fourth Thursday of February, April and October, and the second Monday of June and December. The following were elected to serve for the year 1917: *President*, Henry Skinner; *Vice President*, James A. G. Rehn; *Corresponding Secretary*, Morgan Hebard; *Recording Secretary*, R. C. Williams, Jr.; *Treasurer*, E. T. Cresson; *Publication Committee*, J. A. G. Rehn, E. T. Cresson, P. P. Calvert; *Finance Committee*, J. A. G. Rehn, D. M. Castle, Morgan Hebard; *Property Committee*, E. T. Cresson, Jr., Morgan Hebard, Philip Laurent.

Meeting of February 15, 1917, in the same hall. Dr. Henry Skinner, President, in the Chair; five members and four associates of the Entomological section of the Academy present.

A communication from the North Carolina College of Agriculture was read, requesting the appointment of a delegate from the Society

at the inauguration of Wallace Carl Riddick as President. President Skinner reported that he had appointed Prof. Franklin Sherman, Jr., of the Dept. of Agriculture, Raleigh, N. C., to represent the society.

Dr. Skinner called attention to the requirement of the Society that duplicate material be sent in with papers offered for publication describing new species, and stated that Miss Annette F. Braun had sent in 65 species of Nepticulidae, including cotypes and paratypes, with her paper.

Orthoptera. Mr. Rehn exhibited a specimen of *Circotettix splendidus* from Mount Lowe.

The meeting was followed by an interesting informal talk by Dr. Skinner, illustrated by lantern slides using the newly acquired lantern, and describing and illustrating his collecting experiences in Carolina, Cuba, and the Rocky Mountains of Canada and Arizona. This was followed by a talk by Mr. Rehn, who showed slides of the localities visited by him and Mr. Hebard, in Arizona and elsewhere on their recent trips, and related interesting collecting experiences.—R. C. WILLIAMS, JR., *Recording Secretary.*

Newark Entomological Society.

Meetings of February 11 and March 11, 1917, held in the Newark (New Jersey) Public Library, President Buchholz in the chair; average attendance, nine members.

Lepidoptera. At the February meeting Mr. Rummel exhibited a *Cynthia* cocoon containing two pupae, one of which had hatched, also a series of *Catocala ilia* and the variety *uxor*, which he had collected at Hagerstown, Maryland, July 6, 1916, and *Haploa lecontei* var. *dyari* and var. *militaris* from the same locality. He also exhibited all of the species of *Scopelosoma* recorded in Smith's 1909 list as being present in New Jersey which he had collected during the latter part of October in the Orange Mountains (New Jersey), this being an additional locality. At the March meeting he exhibited a box of inflated larvae of Sphingidae and Noctuidae and commented on the abundance of some species the past summer.

Homoptera. Mr. Lemmer, at the March meeting, exhibited a small form of the Periodical Cicada which he had collected at Lyons Farms (New Jersey), July 14, 1916. Brood VIII is recorded from New Jersey only in Essex County and is due in 1917. His capture might have been an early individual of this brood. Mr. Weiss recorded *Aclerda tokionis* Ckll., from Riverton, New Jersey, on bamboo, May 15, 1916 (identified by Mr. H. Morrison), this being a Japanese scale insect recorded heretofore in the United States only from California.

Hemiptera. Mr. Weiss mentioned at the March meeting his capture of two tropical bugs, *Cardiastethus tropicalis* Champ., and *Solenonotus*

nigromarginatus Champ. (identified by E. H. Gibson), both of the family *Anthocoridae*, at Summit, New Jersey, on orchids from the United States of Colombia.—HARRY B. WEISS, *Secretary*.

Feldman Collecting Social.

Meeting of January 17, 1917, at the home of H. W. Wenzel, 5614 Stewart Street, Philadelphia; nine members present. President H. A. Wenzel in the chair.

The President read his annual address which was ordered to be incorporated in the minutes.

The following officers were re-elected to serve for 1917: *President*, H. A. Wenzel; *Vice President*, Wm. S. Huntington; *Treasurer*, H. W. Wenzel; *Secretary*, Geo. M. Greene, and *Assistant Secretary*, J. W. Green.

Lepidoptera. Mr. Haimbach exhibited a pair of a new form of *Automeris io* Fabr., from Jemez Springs, New Mexico, June 21, 1916, collected by Jno. Woodgate, which he will describe and name later. Mr. Laurent stated that *Samia cecropia* Linn. was more plentiful in Brooklyn, New York, than in Philadelphia, and that they have a different habit. Both this and last winter, while walking around the Flatbush district of Brooklyn, he found that nearly every maple (?) tree had from ten to thirty cocoons attached to the limbs. The strange part was that there were as many cocoons on the branches of the upper half of the tree as on the lower half. In Philadelphia it is seldom that more than three cocoons are found on a tree and these are generally on the lower limbs. Mr. Daecke exhibited a specimen of *Scopelosoma moffatiana* Grt., which he took on the wing, November 11, 1916, at Rockville, Pennsylvania. He said that this species most likely hibernates in the adult state since there are also records of it from very early spring. He also exhibited specimens of *Scoliopteryx libatrix* Linn. collected by Mr. Knull in a limestone cave near Hummelstown, Pennsylvania, January 7, 1917. This beautiful species, which is closely allied to the one mentioned before, is known to hibernate in the adult state. It is very common in Europe, where it is often injurious to willow and poplar.

General. Mr. Haimbach read his translation of a review by Prof. Dr. Karl Eckstein (Eberswalde), in *Illustrierte Zeitschrift für Entomologie*, IV, p. 381, 1899, on the abnormal mating of insects by G. Jakobson, *Arbeiten der russischen Ent. Ges.* (Laboratory work of the Russian Entomological Society), Vol. 31, 1898 (Russian).

In the above article Jakobson treats of three possibilities of abnormal mating:

I. The mating between males and females of different genera and even families: *Buprestis* x *Elater*; *Elater* x *Telephorus*; *Telephorus*

melanurus F. x *Synaptus filiformis* L.; *Strophosomus coryli* F. x *Chrysomela* (*Orina*) *cacaline* Schr.; *Hypera poligoni* L. x *Coccinella bipunctata* L.; *Telephorus melanurus* F. x *Athous niger* L.; *Donacia simplex* F. x *Opoderus coryli* L.; *Coccinella* x *Chrysomela*; *Ocneria dispar* L. x *Pieris brassicae* L.; *Hibernia marginaria* Bkh. x *Orrhodia vaccini* L.

II. The mating of two males with one another: *Melolontha vulgaris* x *M. vulgaris*; *Melolontha vulgaris* x *M. hippocastani*, *Telephorus melanurus* x *Lampris noctiluca*. Sadeau differentiates the two cases as follows: *pédérastie par nécessité* and *pédérastie par goût*.

III. The mating of several males with one female: *Dyctyoptera sanguinea* 5 males x one female; *Tortrix viridana* male and at the same time *Tortrix hepara* male x *Tortrix viridana* female; *Cerocoma* sp. 4 males x 1 female.

In conclusion Jakobson brings out the following two points:

I. It is taking a risk to describe a new species from two specimens taken in copulation as male and female of one species. They may be two males of different species.

II. You cannot unite male and female of a pair taken in copulation as belonging to one species as the male may be one and the female another species.

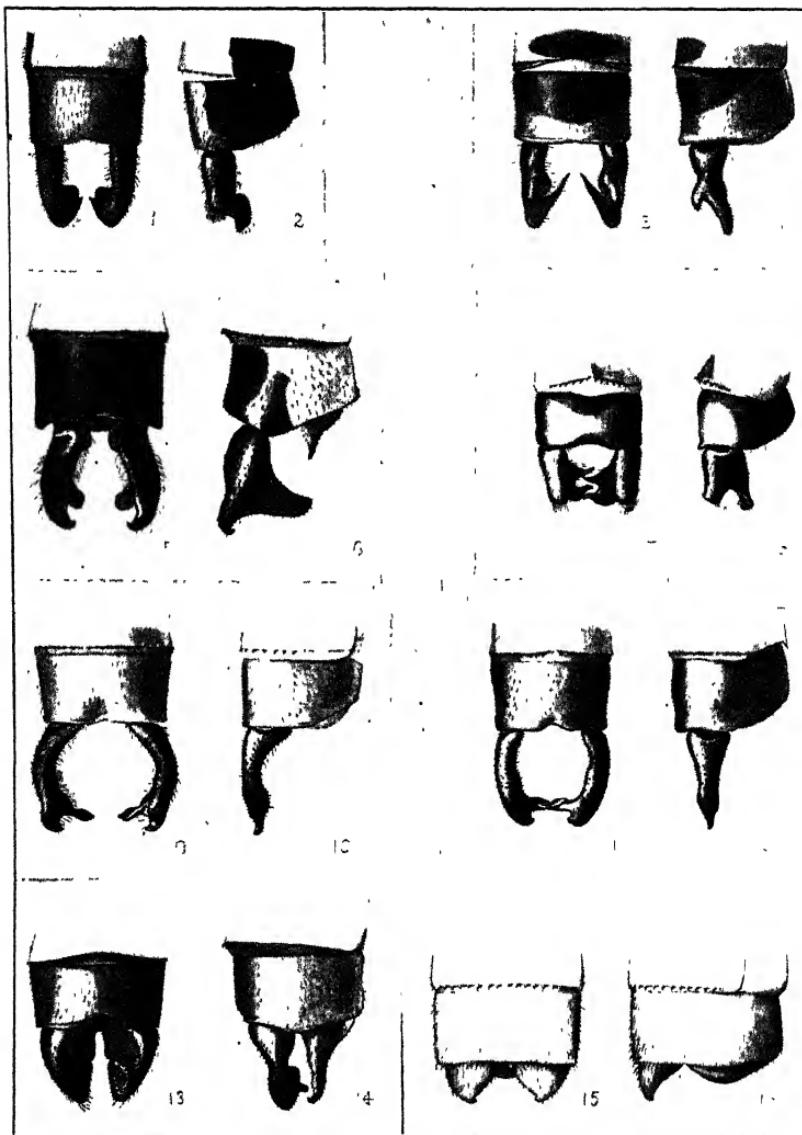
Adjourned to the annex.

Meeting of February 21, 1917, at the home of Wm. S. Huntington, 1910 North 21st Street, Philadelphia; twelve members and four visitors present. President H. A. Wenzel in the chair.

Lepidoptera. Mr. Daecke exhibited *Pamphila huron* Edw. which he collected at Rockville, Pennsylvania, September 30, 1916. Said that while at Progress, Pennsylvania, on June 9, 1916, he had noticed some dried currants which were infested. He took these home and on June 30 *Eulia trifera* Wlk. emerged. He cannot find record that they attack currants, but they are known to feed on various things, mainly huckleberries.

Coleoptera. Mr. Geo. M. Greene exhibited a specimen of *Geotrupes* (*Cnemotrupes*) *ulkei* Blanchard found dead in woods by Mr. Morgan Hebard at Bald Knob, Bath County, Virginia, August 14, 1916. The specimen is minus the head and of three specimens in the Horn Collection, labelled "N. C. Merkel," two are in the same condition and the third perfect. This species was described in *Psyche* V, pp. 106-110, 1888. Type locality Virginia in fungi. Called attention to an article in *Proc. Ent. Soc. Wash.* IV, p. 497, July, 1901, "The Ant-decapitating Fly," by Theodore Pergande, in which is described *Apocephalus pergandi* Coquillett, a fly which decapitated *Camponotus pennsylvanicus* De Geer and afterwards bred from the head.

Adjourned to the annex.—GEO. M. GREENE, Secretary.



APPENDAGES OF LEPTAGRION AND AEOLAGRION MALES.—WILLIAMSON.

- 1, 2.—L. MACRURUM.
 5, 6.—AE. DORSALE.
 9, 10.—L. ELONGATUM.
 13, 14.—AE. FLAMMEUM.
 3, 4.—L. ANDROMACHE.
 7, 8.—L. PORRECTUM.
 11, 12.—L. DISPAR.
 15, 16.—L? CROCEUM.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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Some Species of *Leptagrion* with Descriptions of a new Genus and a new Species (Odonata).

By E. B. WILLIAMSON, Bluffton, Indiana.

(Plates XVII, XVIII.)

Foerster, in *Neotropische Libellen III* (Insekten Börse, XXIII, 1906), describes two new Neotropical Agrionine genera. One of these, *Skiallagma*, type *baueri* n. sp., known only from the male, is stated to be closely related to *Enallagma*, a view with which I can hardly agree, since against the *Enallagma*-like character of the quadrangle (which is not at all characteristic, by the way, being a common form of quadrangle) one can set at once the absence of postocular spots and the origin of A at the cubito-anal crossvein. Calvert (Ann. Carn. Mus. VI, p. 176) describes a second species, basing his generic determination, so he writes me, on the fact that his species seems to be close to *baueri*.

The second new genus proposed by Foerster is *Hylaeagrion*, of which *Leptagrion croceum*, of his determination must be the type, congeneric with which, according to Foerster, is his new *H. argenteolineatum*, known from the male only. The

new genus is separated, by Foerster, from *Leptagrion* by the presence of a vulvar spine in the female, by the unequal teeth of the tarsal claws, and by the form of the superior appendages of the male. But it seems impossible, after comparing Foerster's description of the male appendages of *croceum* with figures 15 and 16 of this paper, that his determination of *croceum* is correct. In fact I am convinced he had a *Leptobasis*, probably *vacillans* before him. As to his new species, *H. argenteolineatum*, I have no doubt this is really *Leptagrion dorsale*, a species in which the vulvar spine is wanting in the female. In *Leptobasis* the vulvar spine is normally present. It is true Calvert (Ann. Carn. Mus., VI, p. 201) describes a new *Leptobasis, mammilaris*, in which the single female lacks this spine. But Calvert's specimen was associated with the males only on supposition, and a female in my collection, which I think is a true *Leptobasis mammilaris*, is different and has the spine well developed.

The type of *Leptagrion* is *macrurum* Burmeister. Among the species associated under *Leptagrion* by de Selys it is proposed to recognize and describe a second genus *Aeolagrion*, type *Agrion dorsale* Burmeister. These two genera may be separated by the following key:

a¹. Descending crossvein from the subnodus not continued directly to the wing margin, the marginal cell, against which it ends, high and pentagonal, the adjoining marginal cells high and the hind margin of the wing full and rounded, nearly paralleling the front margin; M_2 in front wing arising at the sixth postnodal or more distad, in the hind wing at the fifth or more distad; Rs and M_2 widely separated at the proximal crossvein between them; tooth on tarsal claw large, almost equalling the claw; male inferior appendages rudimentary.

Leptagrion.

a². Descending crossvein from the subnodus continuous to the wing margin, the marginal cells on either side of it low and quadrangular, the wing spatulate, the hind margin not paralleling the front margin: Rs and M_2 narrowly separated at the proximal crossvein between them; tooth on tarsal claw well developed but distinctly shorter than claw; male inferior appendages well developed.

Aeolagrion. n. gen.

b¹. M_2 in front wing arising at the seventh postnodal, in the hind

- wing at the sixth; A in front wing arising proximal to the cubito-anal crossvein*; cubito-anal crossvein in front wing distal to first antenodal nearly or slightly more than one-half the second antenodal costal space†, in hind wing more than one-half to nearly two-thirds *A. flammeum*.
b². M₂ in front wing arising at the fifth postnodal, in the hind wing at the fourth; A in front wing arising at or distal to the cubito-anal crossvein; cubito-anal crossvein in front wing distal to first antenodal from one-fourth to one-third the second antenodal costal space, in hind wing less than one-half.

Other species of *Aeolagrion*.

Of *Leptagrion* I have 2 males each of *macrurum* and *andromache*. On the basis of description and figures only, *elongatum*, *porrectum* and *dispar* are also referred to the same genus. I know both sexes of *flammeum* and both sexes of *dorsale* and *demararum* n. sp. On the basis of descriptions only, it is probable *inca* and *obsoletum* belong here. I have no idea in what genus or genera the following species should be placed: *croceum*, *inornatum* and *rufum*.

An examination of the venational characters tabulated later in this paper will show a great deal of variation in relative lengths of the sides of the quadrangle. For example, in the front wing the anterior side may vary in the same species from about one-half the length of the proximal side to longer than the proximal side. Hence characters of the quadrangle based on single specimens are valueless.

The teeth on the tarsal claws seem to offer characters of value but are difficult of clear definition. Several species were studied in a comparative way and the following brief notes made: *macrurum*, tooth large, almost equalling claw‡.

*The editor calls my attention to the fact that fig. 20, pl. xviii, shows A at the crossvein. A reexamination of the wings themselves shows that A is really proximal to the crossvein.

†The space between the antenodals.

‡Of the two males studied, 3 of the 4 hind tarsi are malformed (?); these 3 tarsi are shortened, apparently 2-jointed, and terminated by a single greatly enlarged claw, with a nearly equal inferior tooth. Since this footnote was written Doctor Calvert has called my attention to Child and Young's *Regeneration of the Appendages in Nymphs of the Agrionidae* (Archiv f. Entwickelungsmechanik d. Organismen xv, 103, pp. 543-602, pls. xx-xxii), and he adds: "The cases to which your footnote refers are probably regenerated tarsi." Child and Young's paper is not in my library and I am unable to obtain a copy at this time.

andromache, similar to *macrurum*; *flammeum*, tooth well developed but distinctly shorter than claw, both tooth and tip of claw slenderer than in the preceding two species, the tooth not so divergent, the included angle more acute; *dorsale*, similar to *flammeum*; *demararum*, short as in *flammeum*, otherwise more like *macrurum*; *Leptobasis mammilaris* has the tooth still shorter, that is more basal, and weaker; in *Leptobasis vacillans* it is smaller than in *mammilaris*.

A study of the spines on the legs of various species shows a surprising variation in the number of spines and their distribution or spacing in each species, and no characters of specific or generic value have been detected. The closer spines are set together the longer they appear, other things being equal, since one estimates their length largely in terms of the interspaces.

***Aeolagrimon demararum* n. sp. (Pl. XVIII, fig. 22, text figs. 17, 18).**

Abdomen ♂ 27-28, ♀ 27-30; hind wing, ♂ 16-17, ♀ 17.5-18.5.

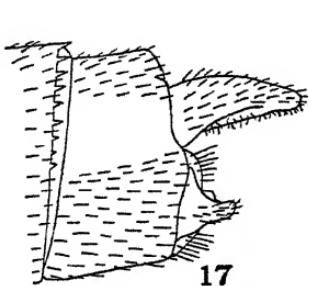
♂.—Labrum to median ocellus, including genae, light dull brown to bright blue green, with all intermediate stages, in specimens otherwise apparently of the same age, the green in transitional specimens appears first on labrum, rhinarium and nasus, and last on the frons above. Head above dark green to black, marked with dull orange in a varying degree; area enclosed by ocelli dark; from this dark area, posterior to the lateral ocelli, on either side a dark bar runs outward and forward, ending behind the antenna and reaching neither the antenna nor the eye; anterior to this bar the head is pale except that usually there is a short bar on either side of the median ocellus, reaching about half-way to the antenna; at its outer posterior portion the dark bar from each lateral ocellus joins with a large dark area which occupies the entire posterior dorsal surface of the head except a pale occipital crest with a dilatation of varying size at either end; in some specimens this pale occipital area is blue or green instead of dull orange. Usually the large posterior dark area rests against the eye, but it may be separated by the merest line of pale blue or green. In a few very mature specimens, as shown by the pruinescent under parts of the thorax, the occipital pale area is scarcely or not discernible, and the pale areas on either side and in front of the ocelli are very dark and obscure, so that, at first glance, the entire dorsal surface of the head, excepting the frons, appears black. Rear of head pale, white or bluish.

Prothorax with front lobe pale blue, the lateral margins light brown, to entirely bright blue; in paler individuals the middle and hind lobes

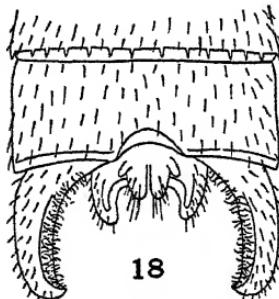
light brown with obscure darker shadings; in brighter individuals these lobes are rich reddish brown above, with a median longitudinal pale blue shading, and the sides blue; hind border wide, with round lateral wings and a rounded median border of the same height. Propleuron pale, almost white to bright blue.

Thorax above very variable; in all a dark metallic green middorsal stripe, on either side about one-fifth as wide as the mesepisternum, with the sides parallel, except at the extreme upper and lower ends; remainder of mesepisternum rust red and very variable; in some the color seems fairly uniform over the entire surface, but in most specimens there is a faint hint to a rather definite pale stripe on either side of the median dark green, and of about the same width; this stripe may show as a lighter rust red or parts of it may be greenish or bluish; in life in bright-colored individuals I recall it as an evanescent bright light blue stripe. Sides from the humeral suture light to bright blue; the mesepimeron usually slightly paler than the metepisternum and metepimeron, with a narrow posthumeral darker blue stripe; a small brown dot slightly above the middle of the first lateral suture and another near the upper end of the second lateral suture. In the case of a few very mature specimens the rust red of the mesepisternum has become almost or quite as dark as the middorsal stripe, in which case the pale stripe on either side of the dark middorsal stripe is distinct and well defined, rusty silvery white in color, the mesepimeron largely overlaid with silvery white, and the under parts and coxae with scattered powdery pruinescence. Coxae and beneath pale, cream or bluish.

Abdomen seen from above, 1 blue with a median brown spot which is usually pale centered; 2 blue with a wide longitudinal median brown, more or less black stripe, which is slightly widened basally and apically, not reaching the base which is pale, and usually slightly separated from the narrowly brown apex; 3 to 6 brown, shading



17



18

Aeolagrion demerarum n. sp.—Left lateral and dorsal views of apex of male abdomen.
Drawings by C. H. Kennedy.

apically on each segment into black which occupies one-fifth to one-sixth of each segment, narrow, medianly interrupted basal blue rings; 7 black, narrow, medianly interrupted basal and subapical pale rings; 8 and 9 bright sky blue; 10 black, more or less pale yellow or bluish near the middle on either side of the median line. In a few very adult specimens 6 is like 7 and the dorsal brown of the preceding segments is much darker than in the larger number of specimens. Seen from the side, 1 and 2 blue with a narrow brown posterior border; 3 to 6 greenish, extreme lower border and over a wider area subapically, bright yellow, more or less obscured and indefinite in most of the dried material; 7 indistinct, apparently blue below the black dorsum; 8 and 9 blue; 10 with lower half blue, in some with the inferior apex yellow. Superior appendages black; inferiors yellow to black. Ventral suture black, paler and duller on the last three or four segments.

Legs light yellow, femora bluish or greenish tinged in some specimens; femora, especially the last 2 pairs, with a more or less distinct narrow dark line on the external angle.

Wings clear; stigma light brown to brown, encircled inside the enclosing veins with a narrow pale margin, covering one cell or slightly less, the inner side slightly more oblique than the outer, with a brace vein, the anterior and posterior sides longer than the other two sides.

♀.—Labrum light yellowish brown; rhinarium similar or darker or with greenish traces; nasus, frons and genae bright yellowish brown to obscure green. Head above as in the male, averaging paler, no trace of the dark bar on either side of the median ocellus, the pale dilatations on either end of the pale occipital crest larger and always dull orange. Rear of head cream-colored.

Prothorax variable as in the male, but the middle and hind lobes always brown, unmarked. Posterior border of hind lobe winged as in the male, but the middle lobe of the border is lower, apex truncated and sometimes slightly concave. Propleuron cream to light blue.

Dorsum of thorax similar to the male; sides similar but paler, sometimes almost white, in others cream or cream tinged with bluish, and so through intermediate stages to entirely pale blue; the brown spot on the second lateral suture scarcely evident in some specimens.

Abdominal segments 1 to 6 similar to the male, but the apical black is confined to a narrow apical ring; 7 and 8 orange brown, slightly darker along the median line, the darker color obscure, indefinite and narrow; 7 with a narrow interrupted bluish basal ring and a trace of an apical black ring; 9 and 10 light yellow brown, 10 sometimes with bluish traces. Pattern of abdomen often obscure; 7 to 10 often a uniform dull yellowish brown; in one specimen the dorsum of 6 is light metallic green instead of the usual brown. Seen from the side similar to the male, usually obscure especially the last four or five segments; in several cases 9 has a large distinct dark area; in other cases 9 and

10 are distinctly paler, light yellow, in the lower half; usually 7 to 10 are obscure brown or dull orange. Ventral suture as in the male. No trace of a vulvar spine.

Legs cream colored or very light brown, similar to the male, but the femoral stripes wanting or faintly represented on the last femora only.

Wings similar to the male.

British Guiana: Georgetown, January 25 and 26, and February 18, 1912, 19 ♂, and 7 ♀; Wismar, January 30, 1912, 1 ♂; types, a ♂ and ♀, January 26, in my collection.

In the Botanic Gardens at Georgetown in January, 1912, many of the pools were dried up and all canals and pools were at a very low water stage. Just a short distance from one of the main drives was a pool grown up with *Nelumbo*, into which pool a very small stream of water trickled. *Demararum* was along this thread of water for a short distance back from the pool, and about the pool near the mouth of the stream. Their flight was rather slow and heavy.

Specimens of this species were sent to Dr. Calvert and Dr. Ris for examination. Both regard it as undescribed. The following species, other than those here figured have been referred to *Leptagrion*: *inca* Selys, *inornatum* Selys, *obsoletum* Selys, *perlongum* Calvert, *rufum* Selys. *Inca* is known from an imperfect ♂ and 2 ♀; *demararum* is distinct from it, among other characters, by the rear of the head entirely pale and by the absence of a post-humeral black band. *Inornatum* is known from a single ♀; *demararum* is distinct from it, among other characters, by the very different stigma, by having the labrum and rhinarium not shining black, and by the thorax having a middorsal dark stripe. *Obsoletum* is known from a single ♂ and ♀; *demararum* is distinct from it, among other characters, by the color of the vertex, and of segments 7-10 of the ♂, and by the form of the ♂ appendages. *Perlongum* is known from a single ♂, supposedly close to *porrectum*, and having the abdomen 64 mm. in length, more than twice the length of *demararum*. *Rufum* is known from a single ♂ lacking the last 4 abdominal segments; *demararum* is distinct from it, among other characters, by the almost totally red coloration of head, thorax and abdomen of *rufum*.

Aeolagrinus dorsale Burmeister. (Type of the genus). (Plate XVII, figs. 5 and 6; Plate XVIII, fig. 21).

Abdomen ♂ 27-30, average 28.3, ♀ 27-28; hind wing ♂ 17-19, average 17.7, ♀ 18-19.

♂.—Genae light bluish green, very pale, to bright bluish green; labrum brown to shining black; rhinarium and nasus bluish green, light and bright in older specimens, the nasus with a little dark or black at base; frons in front bluish green below on the lateral margins, remainder orange or rust brown to dark reddish brown and, in extreme cases, black. Head above metallic green to black, a short orange line from the lateral ocellus outward and forward toward the antenna, reaching a little more than half the distance. Rear of head upper half black, lower half very pale bluish to pale greenish.

Prothorax with the front lobe blue, broadly black posteriorly but not reaching the lateral margins; middle lobe blue, black above, narrow anteriorly, widening rapidly posteriorly where it occupies the full width of the lobe; hind lobe black dorsally with a continuation of the middorsal thoracic stripe, sides blue. Hind lobe laterally winged, the median portion greatly developed in a dorsally directed triangular plate, more than twice as high as the wings, the apex acute, the sides convex. Propleuron pale, bluish above to entirely blue. In very mature specimens the blue of the prothorax is more or less overlaid with silvery white.

Dorsum of thorax its entire length broadly metallic green to black, the stripe gradually narrowed at either end, bordered on either side by a blue stripe, scarcely half as wide, which reaches the humeral suture; a narrow brown or black posthumeral stripe which is continued across the mesinfraepisternum and which shades out into the rust red which occupies practically all of the mesepimeron; with age the mesepimeron darkens till, in extreme cases, it is entirely black except an anterior superior blue spot and a small posterior inferior area which remains rust red; metepisternum and metepimeron very light blue to bright blue, sometimes an indistinct dark area on the metepisternum along the second lateral suture. Beneath and coxae white to pale bluish; coxae externally in older specimens bright to dark blue. The antehumeral blue stripe is sometimes more or less overlaid with silvery white and the same is true to a lesser extent of the blue of the sides of the thorax.

Abdomen from above black, slightly paler on 3 and 4 in younger individuals; a narrow apical blue ring on 1, and narrow interrupted basal blue rings on 3 to 7, yellowish on 7, and on all segments in younger individuals; 8 and 9 bright blue, 10 black. Seen from the side, 1 and 2 blue with a narrow dark apical border; 3 to 6, or 3 to 7 in younger specimens, with sides below yellowish or greenish, connected with the basal rings, and slightly widening subapically, the black of the

dorsum completely encircling the apex of each segment; in older specimens 7 seems entirely black; 8 to 9 blue; 10 black, slightly or distinctly paler below: Appendages black, in younger specimens the inferior dilatation of the superiors and the base of the inferiors brown; the inner surface of the superiors with a large shallow excavation which is densely clothed with long, soft, very light dull yellow hair. Ventral suture yellowish or brown, darker on 6 and 7.

Legs dull pale yellow or light brown; posterior external face and apex of femora black; tibiae with a very narrow dark line on the anterior external face, sometimes wanting.

Wings rarely clear, usually slightly tinged with brown; stigma dark brown to black, encircled or not within the enclosing veins with pale, rarely covering one cell, usually slightly less, shaped as in *demararum*. In a male from Cumuto, in both front wings, the anterior side of the quadrangle is distinctly longer than the proximal side.

♀—Genae pale, yellowish or bluish; labrum brown, sometimes somewhat darkened over much of its area; rhinarium and nasus dull bluish; frons in front as in the paler males. Head above as in the male, except that the frons anteriorly is edged with reddish brown, or, in a teneral specimen, is largely this color. Rear of head as in the male.

Prothorax in pattern similar to the male; front lobe slightly duller, rust red replacing black on the middle lobe, and brown replacing black on the hind lobe. Hind border with the lateral wings of the male greatly reduced, scarcely evident, passing directly into the high, almost semicircular middle part. Propleuron cream to light bluish.

Thorax similar to the male; the narrow posthumeral brown stripe wanting or indistinct; the mesepimeron not becoming black; the dark area on the metepisternum along the second lateral suture usually distinct and rust red in color, sometimes very distinct and occupying nearly one-half the sclerite. Beneath and coxae as in the male, but the coxae never showing more than a trace of bluish. Silvery white over blue areas never as conspicuous as in the male.

Abdomen seen from above similar to the male, except that 8 to 10 are black, very narrowly pale at apex. Seen from the side similar to the male, but the lower pale areas on 3 to 7 wider, of uniform width, not dilated subapically; 8 to 10 similar to the preceding segments, the lower pale area becoming progressively narrower posteriorly, and being continuous along the sides, reaching the apex of each segment. Ventral suture darker than in the male, largely dark brown to black on 3 to 6. Vulvar spine wanting.

Legs light yellow, a narrow line on the external angle and the apex of the femora, black.

Wings very slightly tinged with brownish; stigma light brown, pale-encircled within the enclosing veins, covering rarely one cell, usually very slightly less, shaped as in the male.

Dutch Guiana: Paramaribo, February 23, 1912, 49 ♂, 4 ♀.
Trinidad: Cumuto, March 8 and 10, 1912, 4 ♂, 1 ♀.

Back of the rifle range at Paramaribo is a shallow ditch or mud-bedded stream which, on February 23, 1912, seemed entirely dry. However, I followed it for some distance and eventually discovered a few shallow pools of stagnant water. Near one of these pools and in the bed of the ditch lay a large log which for a short distance was a foot or more off the ground; dense grass grew about the log and thus a little room or cave was formed under the log, the log itself being the roof, the nearly dry mud the floor and the rank grass the sides. At one corner of this little room the grass was wanting, thus affording an open doorway. About this doorway and just within the little room no less than 50 *Aeolagrion dorsale* were taken. When I first discovered them possibly a dozen or twenty were in view, practically all of them well back under the log. At each stroke of the net, those not captured disappeared but in a moment they would be detected again, one here, one there, resting in the grass about the log. *Dorsale* is an inconspicuous species and is easily overlooked in grass. In adjoining woodland I caught two or three about the top of a large fallen tree. I have no notes and recall nothing of the Cumuto specimens which were taken at the little swamp where we took the large number of *Metaleptobasis* (Proc. U. S. Nat. Mus. Vol. 48, May, 1915, p. 601).

Aeolagrion flammeum Selys. (Plate XVII, figs. 13, 14; Pl. XVIII, 20).

Abdomen ♂ 32-35, average 33.2, ♀ 32; hind wing ♂ 21-22, ♀ 23-22.5.

♂.—Genae pale yellowish to pale bluish; labrum slaty blue to bright greenish blue; rhinarium slaty blue to light brown; nasus to ocelli dull orange or rust red. Head above black and dull orange; ocelli surrounded with black, except the median in front; on either side of the median is a short lateral black spur, not always distinct; from each lateral ocellus a black stripe runs forward and outward to meet a wide black area lying against the eye, and reaching inward to the level of the inner side of the second joint of the antenna; anteriorly it extends to in front of the antenna and posteriorly it is carried back over the rear of the head; it is often dark green in color and is always less intense black than the stripe from the lateral ocellus to the

eye. Occipital crest and adjoining area pale, this pale area running forward in a sharp point between the lateral ocelli. The pale area just in front of the stripe from the lateral ocellus to the eye, adjoining the lateral ocellus, is usually bright yellow, paler than the dull orange of other parts. Rear of head largely black, pale below and adjoining the foramen.

Prothorax orange red; the anterior border narrowly indistinctly brown, elsewhere slight, scarcely discernible traces of darker. Posterior border of hind lobe broad and high, rounded, medianly broadly emarginate. Propleuron similar in color to the pronotum, darker below.

Thorax above vivid rust red; mesepisternum with a longitudinal median stripe about one-third the width of the sclerite, which in dried material is scarcely evident or is indicated by a dull greenish or brownish stripe, which in life is a vivid light greenish blue, in striking contrast to the surrounding red. Sides paler rust red, especially below and behind; starting just behind the humeral suture and near its upper end, a broad stripe runs directly down across sclerites to end on the third coxae; this stripe is like the stripe on the mesepisternum, evanescent, and in dried material is variously indicated; in life it is a vivid greenish blue area, becoming yellowish on the metinfraepisternum, which appears to have been haphazardly placed on the insect by an artist who carelessly disregarded the boundaries of the sclerites; behind this stripe and parallel to it is a large pale yellowish area of indefinite extent which occupies the metepimeron, except its upper and lower ends, and extends above onto the metepisternum. Beneath and coxae cream-colored.

Abdomen light brown above becoming progressively darker from 1-6; 3-7 more or less distinctly narrowly pale at base; 3-5 black at apex; 3-6 with a trace of a longitudinal middorsal line, scarcely or not discernible on 3 and 4, plainer on 5 and 6; 6 black except at base as noted; 7 subbasally black for one-fifth to one-half its length, the black shading out posteriorly to yellow or orange; 8-10 yellow or orange with much scattered bright red pigment in dried material. Seen from the side 1 and 2 largely yellowish with some basal and apical blue or green traces, the posterior border of each narrowly brown; sides below of 3-6 pale yellow, narrowest and not always evident on 6; on each segment this pale color connected with the pale basal rings, but not reaching the apex, being terminated posteriorly by the apical black which encircles each segment; 7 broadly pale below the dorsal basal black, this pale shading out posteriorly into the pale area which occupies the entire apical portion of the segment; 8-10 entirely yellow or bright red. Superior appendages brown, inner and ventral surfaces more or less red; inferiors yellowish red at base, shading out into bright red, the extreme apex brown tipped. Ventral suture pale, about color of adjoining parts, in some cases darker on 6 and 7.

VENATIONAL CHARACTERS, EXPRESSED IN PERCENTAGES, OF SPECIES OF *Leptagriion* AND *Aeolagrion*, BASED ON THE FOLLOWING MATERIAL:
Leptagriion macrurum, ♂♂, ♀♀; *L. andromache*, 2♂, 1♀; *Aeolagrion fannatum*, ♂♂, ♂♀; *Ae. demaratum*, ♂♂, ♀♀.

<i>Leptagriion macrurum</i>	<i>Leptagriion andromache</i>	<i>Leptagriion fannatum</i>	<i>Aeolagrion dorsale</i>	<i>Aeolagrion demaratum</i>
Quadrilateral in front wing with anterior side equalling about one-half the proximal side about two-thirds—do .....	.....	.....	male 30 female 30	male 30 male 30 female 40
anterior side very slightly shorter than proximal side anterior side slightly longer—do	male 60 “ “	male 90 male 10 female 100	male 10 male 10 female 40	male 60 male 30 male 10 female 60
Quadrilateral in hind wing with anterior side equalling about one and one-fourth the proximal side..... about one and three-fourths—do	male 50 “ “	male 10 male 80 female 100	male 20 male 60 male 100	male 90 male 80 female 80
about twice—do .....	.....	.....	male 20 male 20	male 10 female 20
Cubito-anal cross-vein in front wing distal to first antenodal about one-fourth the second antenodal costal space	male 50 “ “	.....	male 40 male 60 female 40	male 90 male 100 male 10
nearly or about one-half—do .....	.....	.....	male 60 female 100 male 40	.....
slightly more than one-half, slightly more than one-half about one-fourth the second antenodal costal space..... about one-third—do .....	.....	.....	.....	.....
about one-half—do	male 50 “ “	male 50 “ “	male 30 male 40 female 50 male 60 female 20	male 40 male 70 male 60 female 30
more than one-half—do .....	.....	.....	.....	.....
A in front wing proximal to cubito-anal crossvein about one-half the length of the latter..... slightly proximal to cubito-anal cross-vein .....	.....	.....	male 50 male 50	male 20 female 20

Legs light yellow or light yellowish brown; external posterior surface of femora black, apex black or brown.

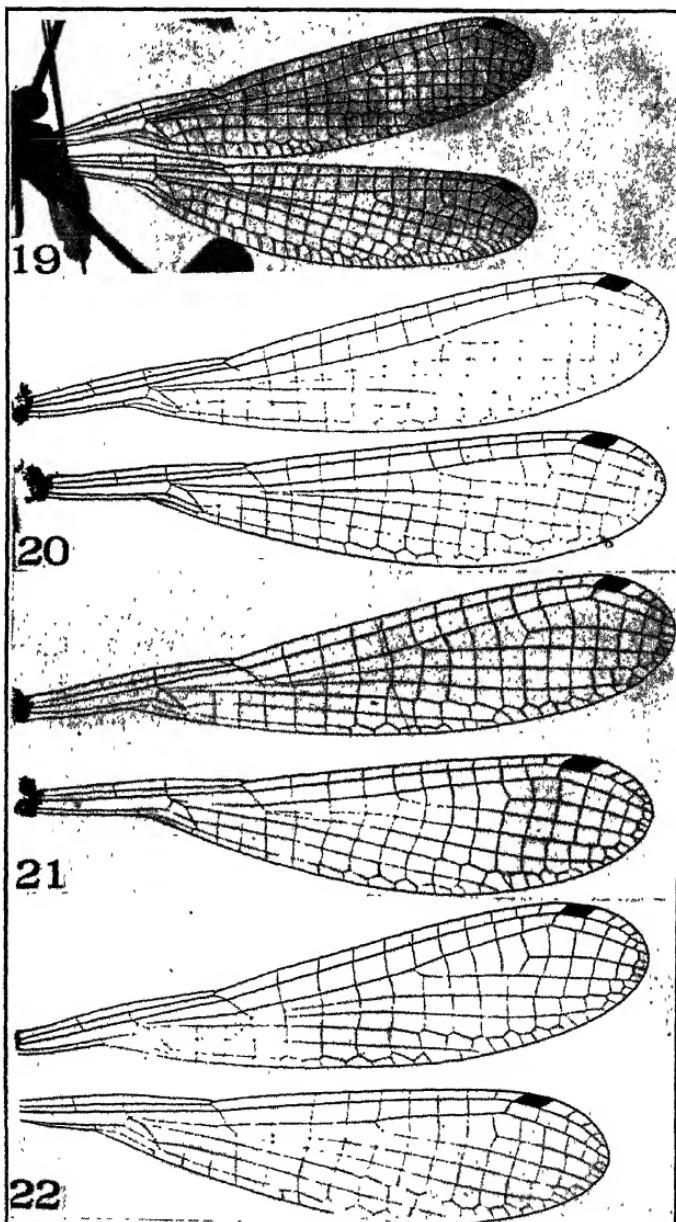
Wings clear to slightly brownish-tinged; stigma brown to reddish brown, encircled with pale within the enclosing veins, covering one cell or very slightly less, very slightly oblique, a brace vein present, the costal and posterior sides distinctly longer than the proximal and distal sides.

♀.—Similar to the male throughout except as noted, as brightly colored, at least in dried material; abdominal segments 7-10, seen from above, black, 10 with apex more or less red; seen from the sides 7-9 are pale below like the preceding segments, and 10 is largely pale with traces of red apically. Vulvar spine wanting.

British Guiana: Rockstone, February 12 and 14, 1912, 5 ♂, 2 ♀; Tumatumari. February 29, 1912, A. F. Porter, 1 ♂.

Three of the males taken at Rockstone were collected by my father and I know nothing of the circumstances as I was at Tumatumari at the time. But on February 14 we went together in the afternoon to the large island in the Essequibo opposite Rockstone. At this time the country was experiencing an unusual drought, the river was at a lower stage than many persons had ever before seen it, and we found the pools on the island dried up and dragonflies scarce. The four specimens of *flammeum* taken were found singly in the woods, in bushes or small trees, resting on the leaves at a height of 6 to 8 feet.

When the above description was prepared and when the manuscript of this paper was sent to Doctor Calvert, I regarded *flammeum* as not congeneric with the species grouped under *Aeolagrion*. Doctor Calvert wrote me that he regarded my distinctions as very fine splitting; and later, in answer to my enquiry, Mr. Kennedy wrote me: "The penes of *flammeum* and *dorsale* are more alike than any other two species in the genus. There are slight differences but these are not generic unless there are good parallel characters in venation or elsewhere." I therefore follow the judgment of these two students in this paper. The key in this paper indicates the characters upon which I was basing my opinion on the generic distinctness of *flammeum*.

WINGS OF *LEPTAGRION* AND *AEOLAGRION*.—WILLIAMSON.19.—*L. MACRURUM.*20.—*AE. FLAMMEUM.*21.—*AE. DORSALE.*22.—*AE. DEMARARUM.*

EXPLANATION OF PLATES.

PLATE XVII. Appendages of males.

Figs. 1-14 by M. Menger from specimens in de Selys collection; figs. 15-16 from Mr. Samuel Henshaw, specimen in Hagen collection. Figs. 5 and 6 have been compared by Mr. Emerton with the type of *dorsale* in the Hagen collection and he reports them identical.

- | | |
|--------------------------------------|---|
| 1, 2. <i>Leptagrion macrurum</i> . | 9, 10. <i>Leptagrion elongatum</i> . |
| 3, 4. <i>Leptagrion andromache</i> . | 11, 12. <i>Leptagrion dispar</i> . |
| 5, 6. <i>Aeolagrion dorsale</i> . | 13, 14. <i>Aeolagrion flammeum</i> . |
| 7, 8. <i>Leptagrion porrectum</i> . | 15, 16. <i>Leptagrion (?) croceum</i> . |

PLATE XVIII. Wing photos.

Fig. 19. *Leptagrion macrurum*. Photo. by C. H. Kennedy of a specimen in Dr. Calvert's collection.

Fig. 20. *Aeolagrion flammeum*, ♂, Tumatumari, British Guiana, February 29, 1912. Photo. by Mr. Munz.

Fig. 21. *Aeolagrion dorsale*, ♂, Paramaribo, Dutch Guiana, February 23, 1912. Photo. by Mr. Munz.

Fig. 22. *Aeolagrion demararum*, ♂, Georgetown, British Guiana, January 25, 1912. Photo. by Mr. Munz.

New Chalcid Flies from Maryland, II (Hym.).*

By A. A. GIRAULT, Glenndale, Maryland.

Neomphaloidella mediogutta n. sp.

♀.—Length, 1.45 mm. Like *Aprostocetus whitmani* Girault, in general.

Dark metallic purple, the wings hyaline, the following parts golden yellow (legs darker yellow): Scape except the bulla and above narrowly, ring-joints, legs except the cephalic coxa laterad at base, the cephalic and middle femora dorsad for proximal two-thirds, proximal half of abdomen laterad and ventrad and the proximal third of same dorsad except for a narrow line across base, an abbreviated marginal stripe (which extends from near the apex of the yellow proximad to a little proximad of the middle) and a round median spot (opposite and between the marginal stripes, its diameter not as long as this stripe and which is not quite at the apex of the dorsal yellow—when the abdomen is retracted against the purple as is the marginal stripe).

Pedicel nearly twice longer than wide, a little shorter than club 1; funicles 1 to 3 subequal or a little shorter in succession, nearly four times longer than wide (joint 1), the club joints about twice longer than wide (but 3 shorter and conical, its terminal spine distinct). Mandibles tridentate. Sculpture usual, the propodeum scaly, with a median

*See Ent. News, xxviii, p. 20. Jan., 1917.

carina, no true lateral but a nearly straight, narrow carina just laterad of the elliptical spiracle. A single seta on scutum disto-laterad; a line of weak setae across pronotum caudad.

From two females, Glenndale, Maryland. From the woods by sweeping, margin of streamlet, July 12, 1916.

Types: Catalogue No. 20372, United States National Museum, two females on a tag, the head on a slide.

Eupelmus 2-guttus n. sp.

♀.—Length 1.65 mm., excluding the ovipositor which is extruded for nearly half the length of the abdomen.

Dark metallic green, the wings hyaline, the proximal third of the abdomen laterad and ventrad, the scape except its dorsal edge, the tarsi, the trochanters, knees, apex of cephalic tibiae, middle legs except a dot dorsad on tibia a short distance ventrad of knee, and a cinctus on the femur just proximad of the knee, caudal leg except the proximal half of the coxa and the tibiae at proximal fourth dorsad, brownish yellow.

Body finely scaly, the face in front of the cephalic ocellus opaque but smooth. Segment 2 of abdomen slightly incised caudad at meson, the others not so. Antenna inserted at the clypeus, the scape a little compressed; funicle 1 ring-like, a little wider than long, 2 and 3 subequal, about twice longer than wide, 4 slightly longer than either, a little longer than the pedicel, 7 and 8 quadrate; club 3-jointed. Fore wings rather slender, the postmarginal vein distinctly longer than the stigmal.

Glenndale, Maryland. One female by sweeping waste places in a garden, July 2, 1916.

Type: Catalogue No. 20365, U. S. N. M., the female on a tag, an antenna on a slide.

Sceptrophorus marilandicus n. sp.

♀.—Of the same stature and so forth as *solus* (Howard), but somewhat smaller and less robust, the basal fourth of the abdomen above (somewhat more below) is pale yellowish except a dot at each margin at base, the scape is wholly pale yellow, the hind tibia bears a metallic spot, a short distance below the knee, and the fore wings have the apex widely infuscated, the infuscation extending conically proximad to opposite the apex of the stigmal vein. Also the tegulae are half pale (basal half), the frons is slightly narrower and lacks the four rows of minute pin-punctures present on the other (or they are very obscure), the mandibles are smaller, their third tooth not so obtuse at apex, subacute, (truncate in the other but not *very* broad), the funicle joints are all shorter, the first subequal to the pedicel (6 quadrate),

there is a large, yellow stain under distal submarginal and all of the marginal veins, the postmarginal vein is slightly longer than the stigmal instead of being shorter; it is subequal to the marginal which is somewhat over thrice longer than wide. Types compared.

Head and thorax finely scaly, the scutum noticeably hairy; the axillae joined or nearly so. Head a little longer than wide, subtruncate at the mouth, the scrobes short, forming a triangle, the frons not prominent, the face inflexed but not greatly. Mandibular teeth subequal, acute. Ovipositor free, very slightly extruded. Eyes somewhat longer than the cheeks. Flagellum long, filiform-clavate, about twice the length of the club which is but slightly enlarged, its third joint longest, subequal to funicle 2. Propodeum glabrous, plane, transverse, shorter at the meson, the spiracle small, oval.

One female, Glenndale, Maryland. Open woods, by sweeping, September, 1916.

Type: Catalogue No. 20637, U. S. National Museum, a female on a tag, the head, a hind tibia and a fore wing on a slide.

BLATTOTETRASTICHUS new genus.

Based on *Entedon hagenowi* Ratzeburg (equals *Tetrastichodes floridanus* Ashmead) and differs from *Ceratotetraстichodes* in bearing but three ring-joints and the antennae are inserted below the middle of the face while the male antennae bear four funicle, three club and two ring-joints. The metallic coloration, white legs (except the first pair of coxae), pale yellow scape, pedicel, ring-joints and abdominal petiole and the fact that the scutum bears scattered, setigerous punctures and the pedicel and funicle 1 are elongate, are characters which make the species easy to be known. The specimens of it seen by me were from the eggs of domestic cockroaches from Louisiana and agree with Ratzeburg's short description: "Die Vorderhüften grösstenteils dunkel," otherwise as in *Eulophus xanthopus* Nees (as to coloration).

Genotype: *B. hagenowi* Ratz., a cosmopolitan species.

The following new species was labelled as the above species, in the collections of the U. S. National Museum:

Epomphaloides ischnopterae new species.

♀. A little less stout than *hagenowi* and black, the legs white, the funicle joints somewhat shorter; scutum with sparse punctures along its lateral margin only; mandibles with but two teeth, 2 broad and truncate at apex; male scape much shorter, much dilated, funicle 1 shorter than the other funicle joints. Otherwise the same.

From a large number of females and several males reared from the eggs of *Ischnoptera*, Plummer's Island, Maryland (E. A. Schwarz).

Types: Catalogue No. 20932, U. S. National Museum, one male, three females on tags, the antennae of each sex on a slide.

A new Species of *Corythuca* from the Northwest (Heterop., Tingitidae).

By EDMUND H. GIBSON, U. S. Bureau of Entomology, Washington, D. C.

During the past January the writer received from Mr. E. J. Newcomer, of the Bureau of Entomology, stationed at Wenatchee, Washington, specimens of what proves to be a new species of *Corythuca*. They were collected by Mr. Newcomer from prarie sunflower, *Balsamorhiza sagittata* Pursh, the type locality of which is known to be dry barren hills in the Rocky Mountains and its range from British Columbia and Montana to California and Colorado.

Corythuca pura n. sp.

Antennae with few long hairs, first segment about twice the length of second, fourth incrassated at the middle. Rostral groove prominent and rounded at the apex; rostrum reaching to middle coxae. Hood considerably raised, about one half as high as long, evenly reticulated and spined, median reticulation subprominent; rear of hood more or less concave, but distinctly globose. Membranous pronotal margins evenly reticulated and closely spined. Pronotum and base of triangular process punctate with apex reticulate. Triangular process bordered entire length with prominent membrane disappearing near apex. Median carina high and prominent with two rows of areolae, the top row not greatly reduced in size. Length 3.8 mm., width 2.5 mm.

Color, antennae ochraceous with apex slightly darker. Eyes black. Above entirely white, no spots of fuscous or color markings. Elytra subhyaline to opaque. Beneath entirely black, but with light brown legs. Beak same color as legs becoming darker towards apex.

This species is near *C. hispida* Uhl., but from which it may be separated by its larger size and by having the median carina of the pronotum higher and with two rows of large areolae and the margin of which is not so concave or curving.

Described from three females and one male which are deposited in the collection of the U. S. National Museum.

Studies on Costa Rican Odonata.

VIII. A New Genus Allied to *Cora*.

By PHILIP P. CALVERT, University of Pennsylvania,
Philadelphia, Pa.

In our recent book on Costa Rica* we have referred (page 255) to the capture, at Peralta, August 8, 1909, of "a medium-sized dragonfly, of an apparently new genus allied to *Cora*." Only a single male was obtained in spite of search in the same locality on following days in August and in March, 1910. The insect is evidently distinct from *Cora*, although the latter is its closest known ally. Mr. E. B. Williamson has very recently obtained a long series of the same genus, and possibly the same species, in Colombia, some specimens of which he has kindly sent me for examination, so that the recognition of this form as generically distinct seems thoroughly justified. The following account is based on the Costa Rican specimen, leaving to Mr. Williamson the future description of his Colombian material.

MIOCORA† new genus.

Possessing these characters of the legion Thore of Selys, viz.: Upper and lower sectors of the arculus (M_{1-3} and M_4) separating from the upper (anterior) end of the arculus; proximal side of the quadrilateral much longer than the distal, its anterior (upper) side concave, costal and subcostal series of antenodals subequal in number but not coinciding in position in most cases; quadrilateral and median cell (M) cross-veined, the former shorter than the latter; and the following characters of the genus *Cora* Selys, viz.: M_3 unbranched, no supplementary sectors between M_4 and Cu_1 , and only one antenodal cross-vein (here the 8th or 9th, front wings, 9th or 10th, hind wings, of the costal series) thicker than the others.‡

*A Year of Costa Rican Natural History by Amelia Smith Calvert and Philip Powell Calvert, New York. The Macmillan Company, 1917.

†Greek *μείων*, less, and *Cora*, in allusion to the reduced venation in comparison with that genus.

‡In the Colombian specimens the thickened antenodal varies from the 9th to the 14th, front wings, 8th to 13th, hind wings.

Its distinctive differences from *Cora*, and indeed from the whole legion Thore of de Selys (1869), are the unbranched condition of Cu₂, the presence of only a single row of cells between Cu₁ and Cu₂, and of only a single row between Cu₂ and the hind margin of the wing.

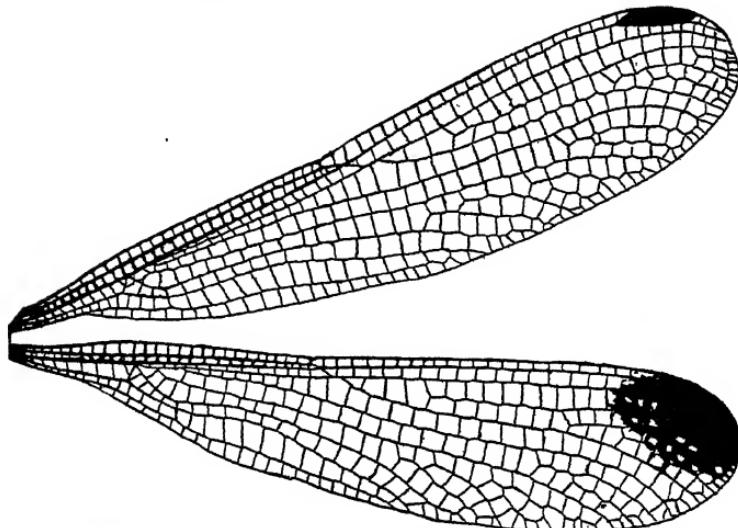


Fig. 1.—Venation of *Miocora peraltica* ♂, Peralta, Costa Rica, August 8, 1909. From photograph by Mr. H. A. Walters. See text for an explanation concerning the front wing.

The venation is displayed in the accompanying figure where, owing to the longitudinal folding of the front wing, M₁₋₃ and M₁₋₂ for a short distance distal to the separation of M₃ is not shown as distinct from R, as it actually is in both front and hind wings, and as shown in our figure of the hind wing.

Genotype: Miocora peraltica n. sp.

Miocora peraltica n. sp. (Text figs. 1-4).

♂. Colors (as noted from the freshly caught specimens, some additional details not mentioned in the field notes but visible in the dried specimen being added in brackets []): Eyes dark brown, below somewhat bluish. [Remainder of the head black, a short orange streak between each antenna and the median ocellus but nearer to the antenna], labrum, genae and external surfaces of the mandibles light blue, [cardines, stipites, submentum, mentum and basal two-thirds of median labial lobe pale luteous, probably also light blue in life.].

[Prothorax black, a pale blue? spot on each side of the middle lobe.]

Thoracic dorsum blackish; humeral suture, most of metepisternum and much of metepimeron pale bluish-green, but metepisternum and metepimeron each with an [oblique] blackish stripe, less than one-half as wide as the metepisternum but more than one-half as wide as the metepimeron. [Pectus pale bluish-green.]

Abdomen black, a spot on each side of segment 1, a longitudinal stripe on each side of 2 and a small basal spot on each side of 3, pale green.

Ventral surface of thorax pruinose and traces of pruinosity on ventral surfaces of abdominal segments.

[Legs: femora superiorly, tibiae inferiorly and tarsi blackish brown, femora inferiorly and tibiae superiorly pale, perhaps bluish in life.]

Superior appendages twice as long as abdominal segment 10, hardly as long as segment 9, black, in dorsal view forcipate, each becoming more slender to the apex which is acute and bent mesad at the extreme tip. Each appendage has a straight inferior process, projecting mesad, ventrad and caudad, best seen in oblique dorso-lateral view, and whose

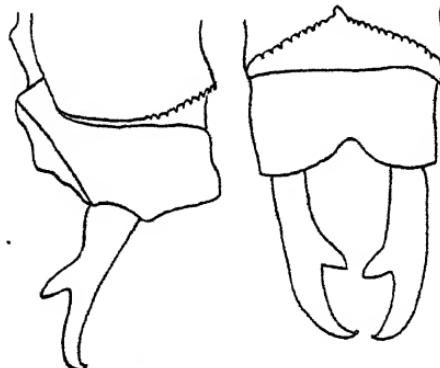


Fig. 2.—Left profile, Fig. 3.—Dorsal
Views of apex of abdomen of *Miocora peraltica* n. sp., type ♂.

proximal and distal edges separate from the inferior margin of the appendage at $5/14$ and $8/14$ of the latter's length respectively; distal edge of this process $3/14$ of the length of the appendage; process becoming more slender toward its roundly acute apex. In profile view each appendage is directed caudad and ventrad as far as the last tenth of its length where its acute apex is curved dorsad; the appendage gradually decreases in thickness from base to apex, shows on its inferior margin a slight post basal convexity and the process described above, foreshortened at about mid-length. Inferior appendages not developed.

Front wings: 26 to 28 antenodals, 24 to 25 postnodals, 10 cross-veins in the median space, 3 cross-veins in the quadrilateral, pterostigma surmounting five cells and parts of one or two others, its proximal edge twice as long as its distal edge.

Hind wings: 25 to 22 antenodals, 24 to 26 postnodals, 8 to 9 cross-veins in the median space, 4 cross-veins in the quadrilateral, pterostigma surmounting four cells and parts of two others, its proximal edge 1.6 as long as its distal edge.*

All wings faintly smoky, costal and subcostal areas faintly yellowish from the base distad to beyond the nodus. Hind wings with an apical brown spot extending from about two cells proximal to the proximal end of the stigma to the wing-apex and from the costal margin to M_2 , some cells between M_2 and R_s , also being faintly brown, many of the cells within the area of the spot paler in their centers. Pterostigmata dark reddish brown.

Total length 42, abdomen 34, superior appendage 1.16, hind wing 24.5,

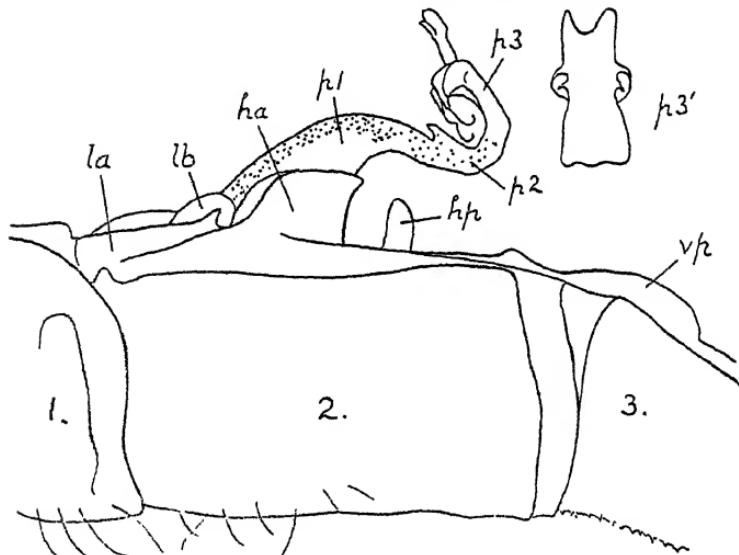


Fig. 4.—Genitalia of the basal abdominal segments, *Miocora perallica*, n. sp., type ♂. The abdomen is viewed from the right side, ventral surface uppermost. 1, 2, 3, abdominal segments 1, 2 and 3; ha , hb , anterior and posterior hamules; la , anterior lamina; lb , lamina batilliformis of Rathke (1832) and Schmidt (1915), sheath of the penis of Rambur (1842) and of American authors; ρ_1 , ρ_2 , ρ_3 , first, second and third segments of the penis of Kennedy (1916); v/p , third segment in dorsal view; v/p , vesicle of the penis ("Samenkapsel").

*As might be expected, the Colombian specimens show some variations in the numbers of these veins and surmounted cells in both front and hind wings.

costal edge of stigma of front wing 2, of hind wing 1.8, maximum width of front wing (mid-way between nodus and stigma) 5.5, same of hind wing, 5.5, width of head 4.8 mm.

Type a male from Peralta, Costa Rica, August 8, 1909, by P. P. Calvert, in the writer's collection at the Academy of Natural Sciences of Philadelphia.

In August, 1909, a short distance back of Peralta Station of the Costa Rica Railway, altitude 322 meters, 1055 feet, there extended a Y-shaped track to enable locomotives to reverse their heading. At the end of the stem of the Y was a narrow, slow-moving stream called simply "laguna." Just beyond the laguna was a low woods consisting of small trees, arums, ferns, heliconias and numerous vines or creepers. Here the type of *Miocora peraltica* was taken about noon.

The generic name *Thore* Selys, 1853, from which his legion *Thore* takes its appellation, was preoccupied by the name *Thore* applied to a subgenus of Attid spiders by C. L. Koch (*Übersicht des Arachnidensystems*, 5tes Heft, p. 66, Nürnberg, 1850). I therefore propose the name *Polythore* for the Odonate genus in allusion to the denser venation of its members in comparison with other genera of the Selysian legion. The type of *Thore* was fixed by Kirby (Cat. Odon. 1890, p. 116) as *T. gigantea* Selys, so this species becomes the genotype of *Polythore*. The oldest generic name thus left in the legion is *Chalcopteryx* Selys, 1853.

The Knaus Collection of Coleoptera.

Mr. Warren Knaus (class of 1882, Kansas State Agricultural College) has donated to the Entomological Museum of the College, his valuable collection of Coleoptera. Ever since he was a student in the College, Mr. Knaus has spent practically all of his spare time and vacations in collecting and studying the Coleoptera. He has made many trips into the arid regions of Mexico, Arizona, Texas and New Mexico to collect insects. These trips have been productive of a great many new species. His collection contains a number of species that are only found in one or two museums in the world, and these were furnished by Mr. Knaus. His collection will be kept separate and will be known as the "Warren Knaus Collection."—GEORGE A. DEAN, Manhattan, Kansas.

Two new Species of *Macrophyia* (Hym.).*

By S. A. ROHWER, Specialist in Forest Hymenoptera, Bureau of Entomology, Washington, D. C.

In a recent number of *Entomological News* (1916, vol. 27, pp. 274-77) Phil Rau has described, in some detail, the dance of a species of *Macrophyia*. Inasmuch as the species was undescribed it is desirable that it should be named so that the observation may be catalogued and made available. The species described as *ravii* is the one referred to in the beginning of Mr. Rau's paper, and the species described as *simillima* is probably the species recorded as being captured later in the week. From the material at hand it is impossible to make this assertion positive as the individuals are not dated. Both of these species belong to *Macrophyia* in the restricted sense.

Macrophyia rauii new species.

Macrophyia sp. Rau. Ent. News, 1916, vol. 27, p. 274.

This species is closely allied to *punctata* MacGillivray and *propinquua* Harrington. From *propinquua* it may be separated by the spot on the hind tibiae, the mostly black clypeus and labrum, and poorly defined middle fovea; from *punctata* the shape and size of the postocellar area will serve to distinguish it.

Female: Length 8.5 mm. Anterior margin of the labrum truncate; the clypeus deeply, arcuately emarginate, lobes broadly rounded apically; middle and frontal foveae not well defined; antennal furrows complete; front punctured; postocellar area more than twice as wide as long, the sides curved, the surface with rather close, large punctures; postocellar line one-third shorter than the ocellocular line; vertex, except the posterior part, shining, impunctate; third antennal joint but little shorter than the fourth and fifth joints; scutum and prescutum shining with separate distinct punctures; scutellum closely punctured; scutellar appendage completely roughened; mesepisternum striopunctate; metepimeron normal; third cubital cell subequal in length with the second; sheath narrow, rounded apically, convex below.

Black; labrum in the middle, two small spots on the clypeus, an inconspicuous spot on the mandible, two very small spots on the vertex, the posterior margin of the pronotum narrowly, the anterior margin of

*Contribution from the Branch of Forest Insects, Bureau of Entomology.

the tegulae, two small spots on the propodeum medianly, a line on the anterior and intermediate coxae, a spot on the posterior coxae, all the trochanters, the apices of the anterior femora beneath, the four anterior tibiae beneath, the four anterior tarsi except apices, a spot at the base of the hind tibiae and a curved mark near the middle, the dorsal surface, the dorsal basal part of the second and third joints of the hind tarsi, and the base of the fourth hind tarsus—white or yellowish white; wings subhyaline, venation dark brown, stigma slightly paler.

Male.—Length 7 mm. Except for the usual sexual characters the male agrees in structure with the female. The anterior half of the clypeus is white and the posterior portion of the pronotum shows only a faint indication of the white band. In some of the male paratypes the white band of the pronotum is as distinct as in the female.

St. Louis, Missouri. Described from three females and seven males collected in April, 1915, by Phil Rau and given his number 1518.

Type.—Cat. No. 20907, U. S. N. M.

Macrophyia simillima new species.

This species is related to *alba* MacGillivray, but the short antennae and long postocellar line easily separate it from MacGillivray's species. In habitus it resembles more closely *xanthonota* Rohwer, but the black hind coxae of that species readily separate the two.

Female.—Length 7.5 mm. Anterior margin of the labrum truncate; anterior margin of the clypeus broadly, deeply, arcuately emarginate; the lobes narrow and rounded apically; middle and frontal foveae represented by glabrous spots; antennal furrows obsolete; front closely punctured; postocellar line subequal in length with the ocellocapital line and one-fifth shorter than the ocellular line; postocellar area with its anterior width but little greater than its length, much wider posteriorly, the surface with a few large, well defined punctures; the sides of the vertex shining, almost impunctate; antennae shorter than the head and thorax, the third joint subequal with the fourth and fifth; scutum and prescutum opaque, and with a number of irregular poorly defined punctures; scutellum shining, the sides with large, well defined punctures, the appendage opaque and with two or three large punctures; mesepisternum reticulate on a finely granular surface; mesepimeron slightly produced posteriorly, shining, impunctate except the dorsal posterior angle where it is finely granular; second cubital longer than the third on the radius, subequal on the cubitus.

Black; base of the labrum, clypeus except the anterior margin, line on the mesepisternum, posterior margins of the pronotum broadly,

tegulae, large spot on the scutellum, propodeum except the sides—white or yellowish white; legs yellow; the apices of the four anterior tibiae above, the anterior tarsi above, the apices of the middle tarsi, the apical half of the posterior femora, extreme base of the posterior tibiæ, the apex of the posterior tibiæ, extreme base and apex of the first joint of the hind tarsi and the apices of the second and following joints of the hind tarsi, black; calcaria of the hind tibiae black and the other tibiae pale; wings slightly yellowish hyaline, venation including the stigma dark brown.

Male.—Length 7 mm. In color the male differs from the female in the white labrum and in the entirely black hind tarsi; in structure it agrees except for the usual antigeny.

St. Louis, Missouri. Described from one female (Rau No. 1531) and one male (Rau No. 1533), collected in April, 1915, by Phil Rau. A male and female paratype also come from Lincoln, Nebraska, collected in May, 1902, by W. D. Pierce. A female paratype from Michigan and a female paratype from Ithaca, New York, have a brownish spot on the basal dorsal part of the four anterior femora.

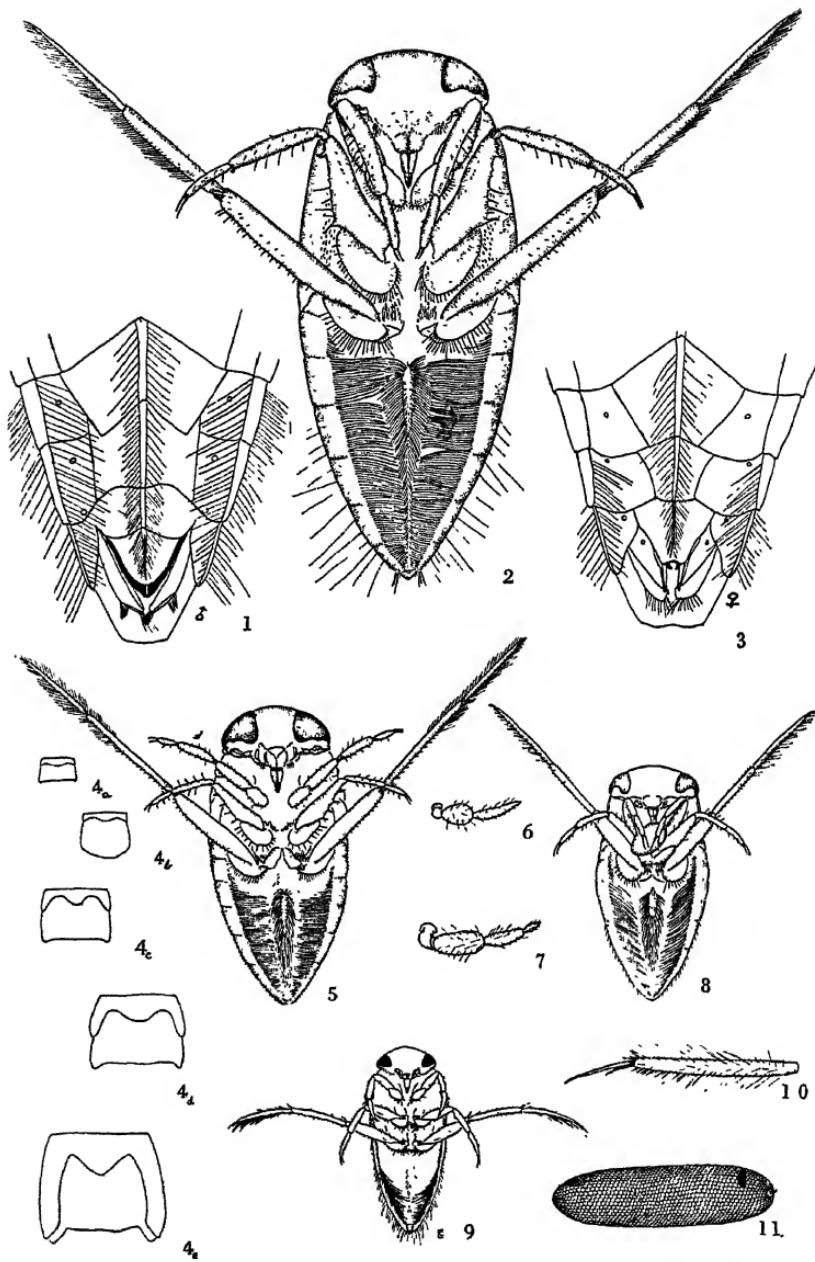
Type.—Cat. No. 20908, U. S. N. M.

Summer Work on Insects

Professor M. M. Ellis, of the University of Colorado, will conduct a course on the Natural History of Insects (elementary collegiate zoology being a prerequisite thereto) and will direct special or research work on insects at the Summer Session of the Biological Station of the University of Michigan, at Douglas Lake, Michigan, from July 2 to August 24, 1917.

Calopteryx dimidiata apicalis (Odon.).

In recently looking over some Odonata I found a damaged male of this species with the following data: "Dragonfly taken from canoe on Rancocas Creek three-quarters mile below New Lisbon, N[ew] [Jersey] Aug. 17, 1911, by S. N. Rhoads. About five males like this and as many females with less black were seen. Nowhere else seen. Always over water in shady places. A rare species there." Brown's Mills (also on the Rancocas) and Raccoon Creek are the only other records for the Delaware valley in the 1910 list of the Insects of New Jersey, so the recording of the present specimen is justifiable. The specimen has gone to Dr. R. Heber Howe, Jr., of Concord, Massachusetts.—PHILIP P. CALVERT.



H. B. Hungerford del.

NOTONECTA UNDULATA.—HUNGERFORD.

The Life History of the Backswimmer, *Notonecta undulata* Say (Hem., Het.).

By H. B. HUNGERFORD, Cornell University.

(Plates XIX, XX.)

Of all our American water bugs none are more generally known in their native haunts than the Backswimmers. They are to be found in nearly every pool and pond and afford most interesting objects for aquarium study. The fact that they swim on their backs readily distinguishes them from all other water bugs.

The family Notonectidae, to which these bugs belong, is a small one, there being but three genera and a total of eighteen species reported for America north of Mexico. All but four species are assigned to the genus *Notonecta*, to which our commonest forms belong. These bugs are all of fair size (8-17 mm.) and for the most part marked with black and white or with black and various shades of red or brown. The various species of this genus may be distinguished by the table prepared for their identification by Mr. J. R. de la Torre Bueno (1905).

In New York State we find several interesting species in the same pool while in the ponds of Kansas the black and white *N. undulata* is the common and almost the only form taken in collecting. It is the life history of this species that this paper presents.

LITERATURE.

So far as the writer has been able to find there is no account in the literature concerning the complete life history of any of the species of the genus *Notonecta* which are often dominant forms in our pools and ponds in America. Mr. J. R. de la Torre Bueno (1905) in his *Notonecta of North America* describes the egg of *Notonecta undulata* and records having reared them to the second or third instar when they died for want of proper food—he also presents some notes on the egg stage and number of nymphal instars of *N. variabilis*. Christine Essenberg (1915) describes the egg of *N. undulata* and gives a general account of the *Notonecta* egg, its incubation

and hatching, the behavior of the young nymph and the duration of the first nymphal instar. She did not carry them farther because of the difficulties involved.

In the literature dealing with the species in other lands, Kirkaldy (1897) in a footnote to his "Revision of the Notonectidae," stated his success in rearing to the third instar and regretted his inability to record the complete cycle, though he correctly surmised that there are five nymphal instars.

Delcourt (1907) gives brief reference to the number of instars and states that he reared *N. glauca* on mosquito wrigglers. This author was chiefly concerned with taxonomic problems as is shown by the title of his paper, "De la Nécessité d'une Revision des Notonectes de France."

In 1911 D. Nowrojee gave the most complete account of the life history of any member of the subfamily *Notonectinae*. His paper deals with *Enithares indica* Fab. and is a two page account accompanied by four figures (egg, nymph, and adult) in color. A description of the egg, the length of incubation and the duration of the various instars are given.

Hoppe (1912) in his paper on "Die Atmung von *Notonecta glauca*" makes a few remarks on the life history, noting five nymphal instars.

On the other hand the behavior of these insects has been the subject of careful study on the part of a number of workers—especially in relation to respiration.

Brocher (1909, 1913) and Hoppe in Europe have made extended studies on the respiration of *Notonecta glauca* and Christine Essenberg (1915), of Berkeley, California, has written upon the behavior of four California species.

In addition to the above more important references, dealing with species of *Notonecta*, there are many interesting notes to be found in the text-books and scattered through the literature from an early date to the present time. Some of these will be noted in the body of this paper or listed in the Bibliography.

HABITAT AND MIGRATION.

Notonecta undulata, besides being the most widely distributed form, seems to be able to adapt itself to a wider range

of circumstances than most of the others. The writer has taken it in clear spring-fed pools in New York and in the stagnant scum-covered waters of muddy ponds in Kansas. Uhler (1876) says "it inhabits the foulest pools, in dirty slush and slimy ponds it revels in full enjoyment of the filth."

Barber (1913), in a popular paper on Aquatic Hemiptera, makes a similar reference to its habitat. Thus it may be noted to be less sensitive than many others of its genus to its environment. When the small bodies of water recede during the prolonged period of dry weather, which we sometimes have in late summer in Kansas, it is among the last to take wing to more favorable situations, a fact which is not to be accounted for on the basis of weak powers of flight, for it does on occasion fly very well, as appears to have been noted for the European forms at an early date. Aldrovandus spoke of them as amphibious bees and Swammerdam, at the close of his discussion of the *Notonectae*, a name applied to them by Mouffet, 1634, makes the following interesting remark in regard to the migration of water bugs: "As all the insects hitherto enumerated have wings, some of them flying in the daytime and others at night, it is easy to conceive that they may be very speedily generated in all standing waters."

In the first warm days of spring, the writer has observed them coming by the dozens and alighting in a small road-side pool. Thus their range, which was restricted by the drouth of the previous fall, was again extended to the many favorable pools of spring and early summer. There are several records of Corixid migrations in this country but only one, so far as the writer knows, for *Notonecta*. In September, 1846, near the head waters of the Mississippi, S. G. Simpson reported a swarm of "*N. glauca*," which extended over 25 or 35 miles. This species, if a Notonectid at all, was doubtless the common *N. undulata*.

FOOD AND FOOD HABITS.

The predatory tendencies and the daring attacks of these insects upon other animals of formidable size have been known from the first biological notes concerning them. Nearly every

writer has enlarged upon this point, but they also feed quite largely upon ostracods and similar organisms, especially in their younger stages as has been previously pointed out by the writer.* He began his attempts at rearing by using mosquito wrigglers as recommended by Delcourt, but met with indifferent success, perhaps because he did not secure them in proper sizes. It was soon discovered that ostracods made an excellent fare and afforded a constant supply. A large aquarium was teeming with them, from which they were transferred by means of a pipette to the small petri dishes in which the notonectid nymphs were isolated. It is interesting to watch the nymphs feed upon these little bivalves. The capture and consumption may be watched under the binocular with ease for the prey is held against the venter, which is upper-most as shown by the drawing, Pl. XIX, fig. 8.

The little notonectid is not prone to carry on an extended chase, doubtless aware that success is more surely attained by waiting until the prey comes within striking distance, than by sustained effort.

Thus it rests suspended from the surface film with the rowing legs poised well forward of right angles to the body, ready for a sudden attack. At last an unsuspecting ostracod comes gliding over the bottom of the petri below, a sudden dart, dodge and a turn and notonecta returns to its former position on its back, tip of the abdomen at the surface film and the body sloping head downward at its customary angle, but now embracing the luckless bivalve with both fore legs. With the armored prey, held prisoner upon the coxae of the fore legs, it turns it about to find a vulnerable point in which to jab its stylets—at last success is attained, the valves open and do not close again for the nymphal backswimmer feeds. Though partaking of the contents of this ostracod and both fore legs busy retaining perhaps as many as two others, gathered since the feeding began and which are striving to escape, this greedy fellow dives again and again at other ostracods that pass near by. Finally, having exhausted the supply of nutriment con-

*Science N. S. Vol. XLV, No. 1162, Page 336, April 6, 1917.

tained in the captured victims, their shells are cast aside and the process repeated as opportunity affords. A careful examination of the field notes brings to light the fact that at the time when *Notonecta* nymphs in their first and second instars were in their greatest numbers, both in their spring and summer generations, the waters were teeming with ostracods. In the laboratory nymphs have been carried through the first four stages on ostracods alone, but as a rule they were supplied nymphal corixids in the later instars. The corixids have been found very satisfactory for *Belostoma* nymphs also.

ADAPTATIONS TO AQUATIC LIFE.

Much has been written upon the adaptation of *Notonecta* to an aquatic life. Brocher (1909) places them with the Nau-corids, midway between the less modified Corixids and the more greatly modified Nepids. He was considering the matter from the standpoint of respiration. Following some clever experiments, in which he removed certain air retaining devices of the body and closed, in turn, various spiracles, he concludes that they inspire through the last abdominal pair of spiracles and that the air retained about the body is for the most part expired air, liberated by the thoracic spiracles. Perhaps the first note in this country representing a close observation of the respiration appeared in the *American Naturalist* for 1887 and was written by Professor Comstock.

OVIPOSITION.

A somewhat detailed account of the literature on the oviposition of these insects was given in the discussion and in an annotated bibliography accompanying the paper "The Egg Laying Habits of a Back Swimmer, *Buenoa margaritacea*," etc., by the writer (1917). In this paper it was noted that *Buenoa margaritacea* places its eggs in the stems of plants. It may be stated that though *N. undulata* may sometimes abrade the surface, as noted by Bueno, the chitinous processes of the ovipositor are ill adapted to making any such deep incision as are made by *B. margaritacea*.* Christine Essenberg (1915),

*On the other hand *N. irrorata* has a long ovipositor and inserts its eggs wholly or in part in the stems of submerged plants. The writer has had the opportunity just recently to study this species and finds the eggs laid in the aquaria placed in incisions of the stems of moneywort, etc.

in California, states that the four species with which she worked place their eggs on the stems. It is certainly the case with *Notonecta undulata* whose elongate white eggs may be found, in large numbers, on the dead stems of weeds lodged in the water or on any other support. Photographs of the eggs are shown in Plate XX, figs. 6, 3 and 4.

SEASONAL RANGE.

The adults may be taken in Kansas any time during the winter when the waters are open enough to permit collecting. They pass the coldest portions of the year in the mud or among the rubbish and dead leaves in the pool. They can even spend as long a time as six weeks in damp piles of dead sticks, so it does not necessarily follow that they perish because the pools diminish during weather when they are but sluggishly active. During the season of 1916 egg laying began about the middle of March and continued till the end of April. The largest numbers were noted on April 11th. By the 4th of May, the first and second instar nymphs were in greatest abundance in all the pools under observation which were teeming at this time with ostracods. The 25th of May found many of the nymphs in the fifth instar and the adults were appearing in numbers June 1st. A few nymphs in the earlier instars were still to be noted, but no eggs had been found for some time.

On June 7th freshly laid eggs were again taken and they continued to be noted up to the first week in August. Many nymphs in their first stages were noted on July 13th and many of these reached the adult stage about August 20th. By this time the pools that had been chosen for the daily field observations were either completely gone or so greatly restricted that observations were transferred to the larger bodies of water.

In the laboratory rearings were made in stender and petri dishes—one bug to a dish. From these rearings it may be said that the eggs laid on March 18th hatched March 30th. Eggs laid April 12th showed the pink eye spots April 16th, and began hatching April 22nd.

The average time for each of the first four instars was 7

days, for the fifth instar 12 days. Eggs laid July 12th hatched July 17th, averaged 6 days for each of the first four instars and 11 days for the fifth—a total of 40 days from the deposition of the egg to the adult stage, a period somewhat shorter than for the spring generation.

DESCRIPTION OF DEVELOPMENTAL STAGES.

The egg. A description of the egg of this species was given by Bueno (1905) as 1.9-2 mm. in length, clear glistening pearly white when recently deposited. Chorion sculptured in irregular hexagons. Shape elongate oval. A large series of freshly laid eggs averaged 1.75 mm. in length, varying from 1.625 mm. to 1.813 mm. The diameter ranged from .5 mm. to .6 mm. The shape of the egg is modified as the embryo develops. The embryo lies with its back to the attached side of the egg as a rule. After a few days incubation the eye spots begin to appear as faint pink blotches—darkening as development takes place till shortly before hatching the black hairs bordering the various portions of the body of the nymphs are visible through the chorion.

Hatching takes place upon bursting the cephalic end of the egg as shown in the photograph. The nymph comes forth swathed in a clear membrane, gradually working its way, by backward and forward movements, till it is nearly clear of the egg shell, whereupon the embryonic sheath splits and slowly the new bug frees itself, the swimming legs being the last to leave the shell. As the legs are freed they spring out into position. When at last the little bug is clear, it rests as though exhausted, then it makes, during the next fifteen or twenty minutes, intermittent endeavors to attain the surface. In these efforts it approaches the surface head uppermost and is heavier than the water—dropping to the bottom as soon as its struggles cease. Finally it may succeed in hooking a front claw into the surface film where it will hang suspended for some minutes. Finally it turns on its side, pierces the surface film, then darts below, the guard hairs closed over a bubble of air—up to this time the guard hairs of the abdomen have rested limp against the body.

In the light of Tillyard's work with hatching dragonfly nymphs and the work of Hoppe and Brocher on the respiration of older *notonecta* nymphs, careful and extended observations on the respiratory activity of the newly hatched water bugs are to be desired.

THE NYMPHAL INSTARS.

First Instar. Size: see table below. Color: General body white, eyes red, hairs and spines black, antennae smoky black. When first hatched the abdomen especially transparent and the movements of the organs plainly visible within. Tarsal claws all conspicuously black.

Structural peculiarities. The most characteristic feature of the first instar is the absence of the tuft of hairs which in all succeeding instars is found on a median ventral carina of the abdomen. The eyes are relatively far apart. The antennae are apparently two-segmented and directed downward (really three segments). The tarsi are all one-segmented and end in two claws. The tarsi of the hind legs are fringed with hairs. The middle femora are furnished on their caudo-ventral margins with two strong bristles set upon elevations.

Second instar. The presence of the tuft and fringe of hairs on the ventral abdominal carina is the chief addition over that of the previous stage. The rear margin of the middle femora are now equipped with three strong bristles and there is a suggestion of the tooth or spine that becomes prominent in the succeeding instar. Antennae 3-segmented. First segment short, disc-like, second somewhat globose and third elongate.

Third instar. The caudal margin of the mesothoracic femur now carries a well developed tooth as well as the three stout spines noted

TABLE OF MEASUREMENTS.

STAGE	GENERAL MEASUREMENTS					HIND LEG			MIDDLE LEG			FORE LEG		
	Length	Width	Width Head	Between Eyes	Synthl. to Vertex	Femur	Tibia	Tarsus	Femur	Tibia	Tarsus	Femur	Tibia	Tarsus
1st instar	2.125	1.062	.833	.48	.818	.687	.707	.875	.437	.437	.813	.37	.875	.275
2d instar	3.1	1.41	1.06	.395	.73	.975	.975	1.12	.63	.625	.437	.5	.58	.37
3d instar	4.66	2.	1.4	.4	.66	1.47	1.47	1.53	1.	1.	.65	.75	.762	.57
4th instar	6.125	2.75	1.87	.58	.66	2.125	2.	2.	1.38	1.37	.93	1.	1.12	.75
5th instar	8.5	3.5	2.5	.66	.584	3.1	2.89	2.75	2.1	2.	1.16	1.5	1.58	1.12
6th ♂	11.4	4.	2.86	.4	.4	4.1	3.48	2.86	2.68	2.57	1.43	1.94	2.28	1.26
6th ♀	11.4	4.28	2.97	.42	.41	4.28	3.54	2.97	2.85	2.88	1.66	2.	2.28	1.48

in the second instar. Tibia and tarsus of hind leg now fringed with hairs—wing pads as in Fig. 4c, Plate XIX.

Fourth instar. The middle femora now bear very stout processes in the line of the caudal row of spines. A series of short processes on the ventral side of this segment take the place of minute rugosities of the previous instar.

Fifth instar. The tooth or strong spine on the mesothoracic tibia is now extremely wide at its base. The limbs are stouter than previously and the wing pads now have the position shown in figure 4e of Plate XIX.

In the above table the measurements are in millimeters and based on reared material. The adults are certainly smaller than those taken in Ithaca, New York, though practically the same as specimens from nature in Kansas. These figures are intended to help in determining an instar. The series measured is not large enough for purposes of generalization.

General notes on development. There are certain constants of structure that are carried through all the nymphal instars. The mesothoracic legs may serve as an illustration of this point. In all the instars the tarsi end in unequal claws as in the adult, and the tibiae possess a row of five bristles on their caudo-ventral margin and the tarsi three such bristles.

The metathoracic tarsi end in an unequal pair of claws which are prominent in the first instar (Pl. XIX, fig. 10) and which become less and less conspicuous as development proceeds till in the adult stage their similarity to the other structures of the swimming leg has led to the common statement that the tarsal claws of hind legs are absent in the adult. Upon transforming to the adult stage the one-segmented condition of the tarsi is replaced by a two-segmented tarsus and the three-segmented antennae becomes four-segmented. (See Pl. XIX, figs. 6 and 7.)

The eyes occupy an increasingly large proportion of the head in successive instars, a point not properly indicated in the drawings which were made from living bugs in the water.

SUMMARY.

Nyctonecta undulata is the most widely distributed of all our backswimmers. It lives well in the aquarium and may be reared from deposition of the egg to the adult stage in some forty days if placed in isolated jars and given proper attention. The young stages thrive on a diet of ostracods and the advanced nymphs do very well on immature and small corixids for a food supply. In Kansas there are two main broods in

a season, one reaching the adult stage in June, the other in August. Since these insects draw quite largely in their young stages upon the ostracods and similar organisms, which represent a chief food supply for young fish, as well as preying upon small fish directly, as has been noted several times, they deserve more careful study. This task is greatly facilitated by a workable key to the species and by some knowledge of their feeding habits.

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EXPLANATION OF PLATES.

PLATE XIX.

- Fig. 1.—Ventral view of terminal abdominal segments of male *Notonecta undulata* Say.
- Fig. 2.—Fifth instar nymph.
- Fig. 3.—Ventral view of terminal abdominal segments of female.
- Figs. 4a to 4e.—Diagrams of dorsal view of meso- and metathorax of nymphs, first to fifth instars respectively, showing the developing wing pads.
- Fig. 5.—3rd instar nymph. Both rows of swimming hairs shown.
- Fig. 6.—Antennae of 5th instar nymph.
- Fig. 7.—Antennae of adult male.
- Fig. 8.—2nd instar feeding upon an ostracod.
- Fig. 9.—1st instar nymph—drawn by Miss Ellen Edmonson.
- Fig. 10.—Tarsus of hind leg of first instar nymph showing the tarsal claws which become less conspicuous as development advances.
- Fig. 11.—Egg of *Notonecta undulata*, showing details of structure, drawn by Miss Ellen Edmonson.

PLATE XX.

- Fig. 1. Two eggs of *Notonecta undulata* after hatching, showing the characteristic slit in the shell and the clear embryonic membrane shed by the nymph upon emerging.
- Fig. 2. Adult *Notonecta undulata* in the water.
- Fig. 3. Egg nearly ready to hatch—note the red eye spot and the dark line at margin of the gelatinous substance which glues the egg to its support.
- Fig. 4. A freshly laid egg viewed from above.
- Fig. 5. A roadside pool in early spring. The backswimmers were arriving in numbers flying from some unknown quarters where they had passed the winter.
- Fig. 6. Eggs of *Notonecta undulata* freshly laid upon old weed stems lodged in the waters of the pool. Gyrinid beetles lay somewhat similar eggs which may be distinguished by their arrangement upon their support and by the fact that the eye spots in advanced eggs are black instead of red and farther from the end of the egg than in those of the backswimmers.

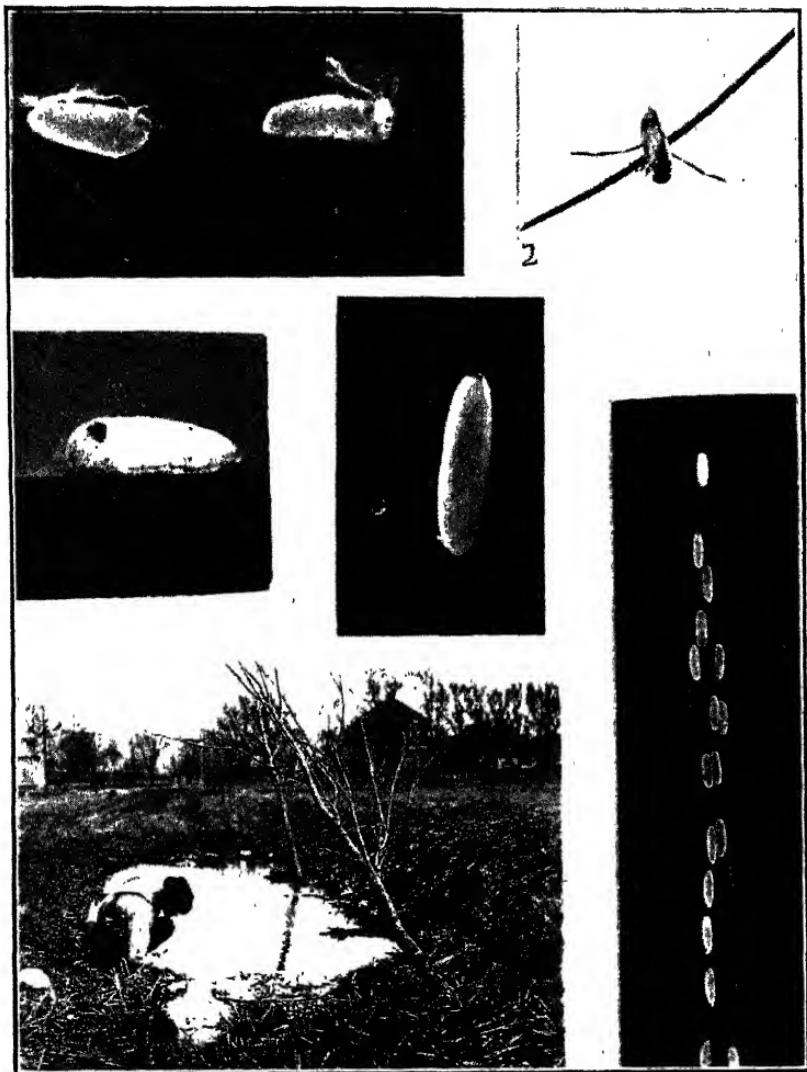
Seasonal Abundance of Flies in Montana (Dipt.).¹

By R. R. PARKER, Bozeman, Montana.

During the season of 1914 the Montana State Board of Entomology started investigations to determine the life history and habits of the house fly (*Musca domestica* Linnaeus) and flies of similar habits common in Montana cities and towns and their relation to insanitary conditions. Investigations during 1914 were conducted mainly at Laurel and incidental observations were made at other points in the Yellowstone Valley during the same season. In 1915 the work was carried on at Miles City and the more important results have been presented in the *Journal of Economic Entomology* for June, 1916 (pp. 326-354). Observations incidental to other work have been made in various other localities.

The present paper concerns the seasonal abundance of flies, particularly the house fly, and the most important portion is based on work done at Laurel during July and August of 1914. This town had a population of about 1200, the houses were

¹Contribution from the Laboratory of the Montana State Board of Entomology, State College, Bozeman, Montana.



NOTONECTA UNDULATA.—HUNGERFORD.

widely separated, the general conditions semi-rural and health conditions very poor. Several previous investigations have concerned the comparative abundance of flies indoors, but the work herein discussed dealt with out-of-doors conditions. Its principal object was to determine approximately the height of the house fly season in Montana. Five places were selected representing a variety of conditions and at each a single Hodge trap was placed out-of-doors. Two traps were placed at residences, at one of which there was a privy, at the other a stable; the third was placed in the rear of a meat and fish market; the fourth, in the rear of a general provision store, and the fifth near an old garbage hole in the rear of the laboratory. The traps were placed in exactly the same spot each day. Collections were made on five days of each week (except Saturday and Sunday) at eight o'clock in the morning. New traps were immediately substituted and the pans rebaited (with fresh beer). At the laboratory the flies were killed with ether and the number of each species recorded for each place of setting. A record was also kept of the noon temperature* and daily weather conditions. The weather records were found to be of no apparent significance.

The results of the experiment are given in the accompanying table, which shows that the house fly reached its greatest abundance (height of fly season) during the first three weeks in August and was present in abundance during the whole month.† It is interesting to note that the height of the house

*During the first week temperature records were taken at three in the afternoon which doubtless accounts for the fact that the average period temperature was higher for the first week than for the second as shown in the table.

†The decrease in the record for the second week in August was due to the fact that during the collecting period of that week, a pile of lumber was placed where the trap was usually set in the rear of the meat market. The results were materially affected because this was the point where most of the flies were captured. The record for this week (2266) shows a decrease of 8265 *Musca domestica* from the number captured at this place during the first week in August and a decrease of 9680 from the number captured the third week. A record corresponding to those of the first and third weeks would have brought the total for the second week well above 20,000.

fly season followed the period of highest average temperature the last week of July and was initiated by an abrupt increase in house flies the first week of August and ended with an abrupt decrease during the fourth week. In September temperature naturally decreases and is attended by a corresponding decrease in the numbers of adult flies. It is a common idea

TABLE SHOWING CATCH OF VARIOUS SPECIES OF FLIES BY WEEKLY PERIODS,
AND AVERAGE PERIOD TEMPERATURES.

Dates of Collecting Periods	Average Period Temperature	<i>Musca domestica</i>	<i>Muscina stabulans</i>	<i>Muscina assimilis</i>	<i>Lucilia sericata</i>	<i>Lucilia caesar</i>	<i>Lucilia sylvarum</i>	<i>Phormia terraenovae</i>	<i>Phormia regina</i>	<i>Calliphora erythrocephala</i>	<i>coloradensis</i>	<i>" latifrons</i>	<i>Fannia scalaris</i>	<i>" canicularis</i>	<i>" sp.</i>	<i>Ophyra leucostoma</i>	<i>Anthonyidae</i> undetermined	<i>Ravinia communis</i>	<i>Ravinia peniculata</i>	<i>Sarcophaga haemorrhoia</i>	<i>Sarcophaga coeteyi</i>	<i>Boettcheria crimbicis</i>	<i>Anacampnia latimacula</i>	<i>Culex tarsalis*</i>
July 7-10	84.0°	2941	1174	10	768	28	10	19	46	57	5	38	31	488	4	1	10	...	1	...	...	1	1	...
July 13-17	80.8°	6276	926	6	229	44	2	5	...	...	...	...	15	4	109	2	2	2	4	...	...	1	1	...
July 20-24	86.0°	4892	315	...	36	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...
July 27-31	91.8°	8979	331	1	115	4	2	...	21	11	108	4	...	...	1	...	...	4	...	...	...	...	1	1
Aug. 3-7	88.6°	20783	284	5	200	13	...	1	42	6	482	3	...	2	6	...	1	...	1	1	...	1	1	...
Aug. 10-14	82.6°	12088	147	5	31	...	1	...	24	5	189	...	...	3	...	1	1	...	...	...	...	...	...	...
Aug. 17-21	75.0°	19425	139	2	57	1	...	...	21	8	241	1	...	4	1	...	...	...	...	...	...	...	...	1
Aug. 24-28	70.0°	12861	157	5	25	...	...	...	37	1	114	2	2	13	...	3	1	...	5	7	1	5	...	6
Totals		88245	3473	34	1456	103	15	25	244	123	2294	18	5	38	14	5	7	1	5	9				

in Montana that flies are most abundant in houses during September, though their number out-of-doors is materially less. Observations have also indicated that other species besides the house fly are more numerous in houses at this time. This is probably because a greater proportion of flies are impelled

* Determined by J. R. Parker.

to seek the warmth inside houses and to remain there for comparatively longer periods than earlier in the season. From this time on flies become fewer and fewer, though they are frequently seen in houses during warm spells as late as December. Observations made in a greenhouse at Bozeman during the winter of 1916 and 1917 indicate that the winter is sometimes passed by continuous breeding in warm places affording suitable conditions. It is probable that the flies also winter over in the pupal state. At Miles City (altitude 2200 ft.) house flies begin to be numerous early in May, later in cities in higher altitudes.

The house fly constituted 91.80 per cent. of the total catch (96,122). The numbers of each of the other species captured and the percentage of the total catch were as follows: *Muscina stabulans* (Fallen), 3473 (3.61); *M. assimilis* (Fallen), 34 (.03); *Lucilia sericata* (Meigen), 1456 (1.51); *L. caesar* Linnaeus, 103 (.09); *L. sylvarum* (Meigen), 15 (.025); *Phormia terraenovae* (Desvoidy), 25 (.03); *P. regina* (Meigen), 244 (.25); *Calliphora*, including *erythrocephala* (Meigen), *coloradensis* Hough and *latifrons* Hough, 123 (.13); *Fannia*, including *scalaris* (Fabricius), *canicularis* (Linnaeus) and an undetermined species, 2294 (2.38); *Ophyra leucostoma* Wiedemann, 18 (.02); undetermined *Anthomyidae*, 5 (.005); *Ravinia communis* R. Parker, 36 (.04); *R. peniculata* R. Parker, 14 (.015); *Sarcophaga haemorrhoidalis* (Fallen), 5 (.005); *S. cooleyi* R. Parker, 7 (.008); *Boettcheria cimbicis* (Townsend), 1 (.001). *Anacampta latiuscula*, 5 (.005); *Culex tarsalis* Coquillett, 9 (.01). Species of *Borboridae* and of *Scatopse* were very numerous, but of course no record of them could be secured by means of Hodge traps.

The above data indicated the great predominance of house flies during the summer months, even under out-door conditions. Their comparative abundance may be expected to be even greater under less rural conditions. The abundance of species of *Fannia*, particularly *scalaris*, and of the blow flies would likely be less in towns having adequate systems for the

care and disposal of garbage. Insanitary privies also permitted the breeding of *Fannia scalaris* and other coprophagous flies in much greater number than would have been the case if privies had been fly-proof. The species of *Sarcophagidae*, which were more numerous than the data indicate, are also far more numerous under rural and semi-rural conditions. It will be seen from the table that *Muscina stabulans* was second in abundance and showed a continual decrease during the summer months. In the spring it is frequently more commonly seen in houses than *Musca domestica*. The species of *Lucilia*, *Calliphora* and *Fannia* also show a decrease in numbers during the period of the experiment, though all show some increase early in August. *Phormia regina* remained about constant. It is uncertain just how accurate an index of the comparative abundance of the various species is afforded by the data presented. The beer used for bait was doubtless more attractive to some species than to others.

As noted at Powderville, Montana, during the season of 1916, blow flies were most abundant during the spring. *Phormia terraenovae* and a species of *Cynomyia*, probably *elongata* Hough, were predominant during the spring months and were followed by species of *Calliphora*. *Phormia regina* and *Calliphora coloradensis* were the more common species in July and August. A knowledge of the seasonal occurrence of the blow flies is likely to be of some value in connection with the blowing of wool at lambing time though at present the species of these flies responsible for this trouble in Montana are not known.

Change of Address.

Dr. Edwin C. Van Dyke, of the Entomological Department of the College of Agriculture of the University of California, will exchange positions temporarily with Dr. J. C. Bradley, of Cornell University. Dr. Van Dyke will leave Berkeley on June 1, 1917, and his address from June 18, 1917, to February 1, 1918, will be Department of Entomology, Cornell University, Ithaca, New York.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., JUNE, 1917.

The National Defense Against and By Insects.

Following out the plan of co-operation proposed by the National Bureau of Entomology to State, Station and other Entomologists, as outlined in Dr. L. O. Howard's letter published in the News for May, (page 229), the Federal Bureau has issued Number 1 of its reports of the "Emergency Entomological Service," dated May 1, 1917, in mimeographed form. It states that

Very gratifying replies have been received to the various letters which recently have been addressed to entomologists throughout the country regarding the great importance of reducing as far as possible, to meet the present emergency, the losses which are caused by insect attack on the staple crops of the country. Sympathetic and hearty co-operation has been promised by all entomologists of the country. . . . It is especially important that during May and June any indications of insect outbreaks be reported promptly by entomologists on account of their bearing on subsequent injury.

Suggestions and reports from twenty State and Station Entomologists from New York to Florida and west to Montana and California are included in this report, along with those emanating from the Federal Bureau, from which we make some quotations:

The Hessian Fly situation throughout the main wheat belt at the present time appears to be reassuring. . . . Considerable infestation still exists throughout the southern part of Illinois and Indiana, in Missouri, northern Oklahoma and eastern Kansas, but the situation can not be considered acute . . . in some of the central counties of Kansas the loss from the Hessian fly this year will be very heavy.

An extensive flight of May beetles . . . is expected to occur during the month of May throughout the northern portions of the United States. The focus of this flight appears to be the State of Michigan. . . . This means a great infestation of grubs during the summer and early fall of 1918.

It is very probable that heavy losses from [the chinch bug] may occur during the coming season in the middle west.

The corn leaf aphis is more than usually abundant in the Southwestern States at present.

Mr. R. S. Woglum reports that there is prospect of greater damage than usual from the principal citrus scale insects in Southern California. Many scale infested orchards were not fumigated last season, owing to the lack of cyanide, which continues.

Mealy bug damage in California is apparently on the increase.

The high cost of materials entering into the composition of insecti-

cides has caused a marked increase in price of certain largely used articles, such as Paris green, arsenate of lead, etc., and may operate against the desired more general utilization of these materials in the protection of crops from insects. An important saving can usually be effected in the consolidation of orders for insecticides for a given neighborhood, or their purchase through fruit-growers' associations, or other co-operative buying organizations. The importance of this saving is realized when it is remembered that the difference in cost of certain insecticides, as arsenate of lead, in small packages at retail stores over its cost in larger quantities from manufacturers or jobbers, is often 100 per cent. [Suggestions for cheaper arsenicals are given.]

We may logically fear that we shall have considerable trouble with grasshoppers, blister beetles and crickets during the coming year [in South Dakota.]

The codling moth and the peach curculio show indications of extensive injury [in Texas].

Circulars are being sent direct to bee-keepers in the chief producing regions urging them to increase production by increasing the number of colonies in so far as it can be done without decreasing the crop, but especially by manipulating their bees in the best manner. . . . In parts of the Northwest, winter losses were excessive and arrangements are being made to have bees sent from the south to replace the loss, since prospects for a crop are poor in parts of the southwest. Crop prospects are good in most of the northern states.

Dr. Felt writes us that Dr. Vaughan, Chairman of the Medical Committee of the National Research Council, has reported in favor of an expert entomologist being attached to every army camp and the above quoted report states that the Federal Bureau has

prepared the manuscript of a brief popular bulletin on insects which are of importance in military operations which will be printed in a short time. The Chief of the Bureau has been conferring with the General Medical Board of the Council of National Defense concerning the organization and utilization of the medical entomologists of the country.

The Bureau hopes to send out this series of reports at least monthly through the summer and autumn.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

A New Biological Journal.

Beginning May 15th, *Psychobiology* will appear every second month and will include in the yearly volume approximately 600 pages. Its pages will be devoted primarily to research which lies in the field common to psychology and the several biological sciences, or which has a distinct bearing on the biological foundations of psychology. No

formal limit of length has been imposed on contributors, but short articles will be preferred, and unnecessary length will be considered a bar to publication.

While the function of the journal will be primarily to promote the speedy publication of research, discussions of important points may be admitted at the discretion of the editors, such discussions being limited in any case to two pages.

Books will not be reviewed but brief notices may be given of books which are deemed sufficiently important. Each book sent for notice should be accompanied by a concise statement of its purposes and contents.

Manuscript submitted for publication should be addressed to Professor Knight Dunlap, The Johns Hopkins University, Homewood, Baltimore, Md., or may be submitted through one of the Associate Editors: John J. Abel, Johns Hopkins Medical School; Walter B. Cannon, Harvard Medical School; Raymond Dodge, Wesleyan University; Shepherd I. Franz, Government Hospital for the Insane; Herbert S. Jennings, Johns Hopkins University, and George H. Parker, Harvard University.—KNIGHT DUNLAP.

The Generic Bugbear.

Those who refrain from subdividing large genera, on the ground that they are facilitating the remembrance of names, are likely to exaggerate the importance of their services. Such persons do not convince me of anything, except that they have never really learned enough names to be able to tell whether many generic names hinder or help. A man can write a monograph containing one hundred species to the genus without being able to name all of the species offhand and without being a judge as regards the easy remembrance of names.

The idea that few generic names facilitate remembering is not a fact, and, even if it were true, would be worthless in practical application. You can remember one generic name better than a dozen, but you can not remember one hundred names in one genus as easily as you can one hundred names in a dozen genera. A biologist who is working with a number of species where he has to identify and write the names frequently can remember them more easily than the names of persons. The generic name does not increase the difficulty of remembering the name of a species any more than the surname increases the difficulty in remembering the name of a man. If every one hundred of your acquaintances had the same surname, do you think you could remember their names more easily?

Suppose you start out to familiarize yourself with the flowers of your neighborhood and their insect visitors. If it is like the neighborhood of Carlinville, you will have to learn a generic name for every 1.7 species. Or suppose you undertake to write offhand the names of the

insects of New Jersey. You will have to learn a generic name for every 2.6 species. The lumpers will have to strain themselves to make the average 2 at Carlinville and 3 in New Jersey. The trouble with the taxonomists who object to genera is that they have adopted the wrong study. They ought to take up some subject where many names are not required. If they distinguish groups which they will not designate with single words, their generic determinations are probably erroneous, and some one else ought to follow them up and name their groups for them, just as Latreille did for Kirby.—CHARLES ROBERTSON, Carlinville, Illinois.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded.

The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new species are all grouped at the end of each Order of which they treat. Unless mentioned in the title, the number of the new species occurring north of Mexico is given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

4—The Canadian Entomologist. 6—Journal, New York Entomological Society. 13—Comptes Rendus, Societe de Biologie, Paris. 50—Proceedings, U. S. National Museum. 79—La Nature, Paris. 87—Bulletin, Societe Entomologique de France, Paris. 177—Quarterly Journal of Microscopical Science, London. 179—Journal of Economic Entomology. 189—Journal of Entomology and Zoology, Claremont, Calif. 195—Bulletin, Museum of Comparative Zoology, Cambridge. 304—Annals, Carnegie Museum. 324—Journal of Animal Behavior, Cambridge. 410—Journal, Washington Academy of Sciences. 411—Bulletin, The Brooklyn Entomological Society. 420—Insecutor Inscitiae Menstruus: A monthly journal of entomology, Washington. 529—Journal of Zoological Research, London. 538—Lorquinia, Los Angeles. 540—The Lepidopterist, Official Bulletin, Boston Entomological Club.

GENERAL SUBJECT. Needham, J. G.—The insect drift of lake shores, 4, 1917, 129-37.

MEDICAL. Howard, L. O.—The carriage of disease by insects, 410, vii, 217-22.

ARACHNIDA, ETC. Moles, M. L.—Another record of a small

whip scorpion in California, 189, ix, 1-7. Nisbet, J.—Solpugids from the Claremont-Laguna region, 189, ix, 22-29.

Chamberlin, R. V.—New spiders of the family Aviculariidae [many newl], 195, lxi, 25-75.

NEUROPTERA, ETC. Bagnall, R. S.—On a collection of Thysanoptera from St. Vincent, with descriptions of 4 n. sps., 529, ii, 21-27. Walker, E. M.—Some dragonflies from Prince Edward Island, 4, 1917, 117-19.

ORTHOPTERA. Bugnion, E.—L'accroissement des antennes et des cerques de la blatte (*Blatta americana*), 13, lxxx, 317-24. Caudell, A. N.—Some interesting O. from Mexico, 420, v, 28-9. Fox, H.—Field notes on Virginia O., 50, iii, 199-234. Merle, R.—Le cypocrane geant, Etudes biologiques de M. Foucher, 79, 1917, 113-117.

HEMIPTERA. Davis, W. T.—Two new Cicadas from Lower California, Mexico, 6, xxv, 6-10. Hempel, A.—Catalogos da fauna Brazileira III. As coccidas do Brazil, 75 pp. (Ed. Museu Paulista, Brazil). Hungerford, H. B.—Food habits of corixids, 6, xxv, 1-5. Oslen, C. E.—Concerning *Gerris remigis*, 411, xii, 21. Smith, H. S.—On the life history and successful introduction into the U. S. of the Sicilian mealy-bug parasite, 179, x, 262-68. Weiss, H. B.—The status of *Lecanium corni* in New Jersey, 4, 1917, 119-20.

Davidson, W. M.—Little known western plant lice, II. [2 newl], 179, x, 290-97. de la Torre Bueno, J. R.—A n. sp. of tingid from New York, 411, xii, 19-20.

LEPIDOPTERA. Dyar, H. G.—A note on *Cisthene*; The Barnes & McDunnough "List," 420, v, 8-10; 41-4. Eastman, W. F.—What is A1 quality? 540, i, 39. Forbes, W. T. M.—The genera of Hydriomeninae of the U. S., 6, xxv, 44-67. Heinrich, C.—Generic description of larva of *Anegcephalesis*, 420, v, 48-50. Knetzger, A.—Entomological notes: a strange case of pupation; a peculiar case of oviposition, 540, i, 38. Mabille & Bouillet—Description d'hesperides nouveaux, 87, 1917, 97-101. Malcolm, G.—Variation in lepidoptera, 538, i, 70. Rau, P.—The courtship of *Pieris protodice*, 324, vii, 143-4.

Bird, H.—New sps. and histories in *Papaipema*, No. 19 [2 newl], 4, 1917, 121-28. Dyar, H. G.—Three new No. American Phycitinae; A new Phycitid from the Bahamas; A new Noctuid from Brazil, 420, v, 45-6; 46-7; 50-1.

DIPTERA. Dyar & Knab—Bromelicolous *Anopheles*, 420, v,

38-40. Malloch, J. R.—Predaceous habit in *Madeterus* and *Psilopa*, 411, xii, 13-14.

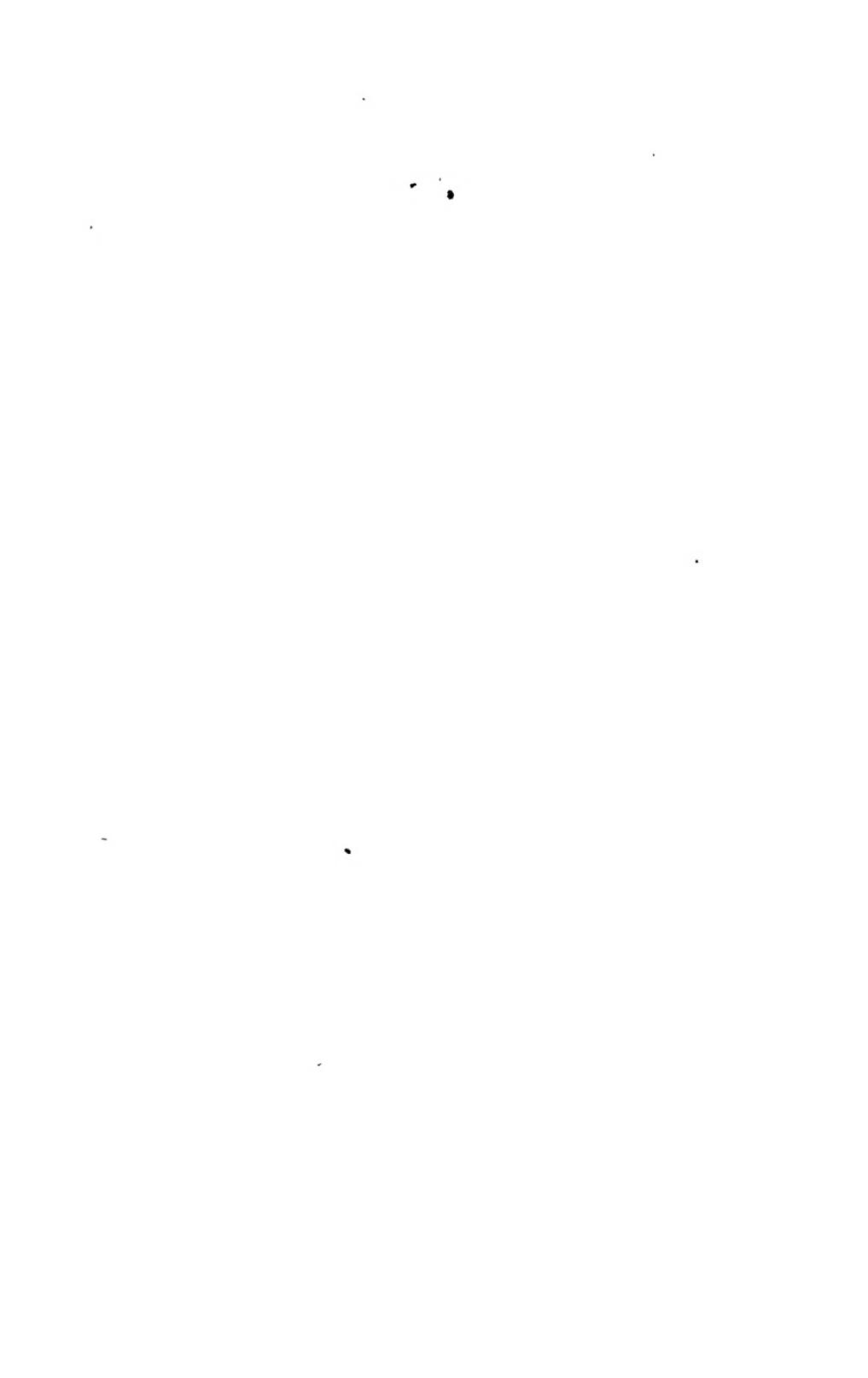
Cole, F. R.—Notes on Osten Sacken's group "Poecilanthrax" with descriptions of n. sps. [5 newl], 6, xxv, 67-80. Dyar, H. G.—The mosquitoes of the mountains of California [1 newl], 420, v, 11-21. Howard, Dyar & Knab—The mosquitoes of North and Central America and the West Indies. IV. Systematic description, Pt. II. (Carnegie Institution of Washington. Pub. No. 159, Vol. IV, 525-1064.) Johnson, C. W.—A new maritime anthomyiid, 4, 1917, 148. Townsend, C. H. T.—A synoptic revision of the Cuterebridae, with synonymous notes and the description of one n. sp., 420, v, 23-28.

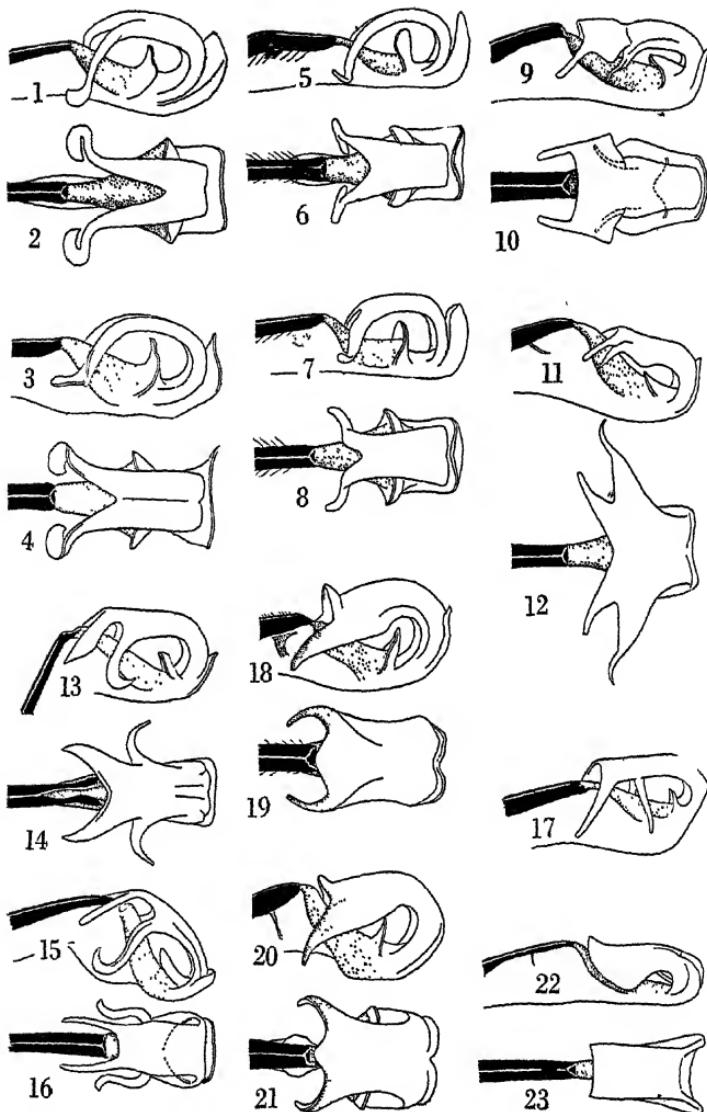
COLEOPTERA. Angell, J. W.—Notes on Lucanidae, 411, xii, 22. Chittenden, F. H.—The two-banded fungus beetle, 179, x, 282-87. Hayes, W. P.—Studies on the life-history of *Ligyrus gibbosus*, 179, x, 253-61. Hyslop, J. A.—Notes on an introduced weevil (*Ceutorhynchus marginatus*), 179, x, 278-82. Leng, C. W.—*Cardiola obscura* on Staten Island, 6, xxv, 80-1. Nicolay, A. S.—Synopsis of the Anthophilax of No. America, 6, xxv, 38-44. Williams, F. X.—Notes on the life-history of some No. American Lampyridae, 6, xxv, 11-33.

Blatchley, W. S.—On some new or noteworthy C. from the west coast of Florida [6 newl], 4, 1917, 137-43. Fall, H. C.—The eleventh Pleocoma, 41, xii, 15-16. Leng, C. W.—A new variety of *Scaphinotus*, 6, xxv, 34-6. Synopsis of the species of *Arthromacra* [2 newl], 411, xii, 16-19. Van Dyke, E. C.—A new sp. of the genus *Anthophilax*, 6, xxv, 36-7.

HYMENOPTERA. Busck, A.—Notes on *Perisierola emigrata*, a parasite of the pink boll worm, 420, v, 3-5. Cockerell, T. D. A.—Some euglossine bees, 4, 1917, 144-6. Ducke, A.—As Chrysidiadas do Brazil (Catalogos da fauna Brazileira), iv, 31 pp. Gatenby, J. B.—The embryonic development of *Trichogramma evanescens*, monembryonic egg parasite of *Donacia simplex*, 177, lxii, 149-188. Holland & Rohmer—List of the H. collected on the Isle of Pines by G. A. Link, 1912-13, and contained in the Carnegie Museum, 304, xi, 291-96. Muir, F.—On the synonymy of *Delphax maidis*, 4, 1917, 147. Sladen, F. W. L.—Collecting wasps and bees, 4, 1917, 113-17.

Girault, A. A.—The occurrence of the genus *Parachrysocharis* in the U. S. [1 newl], 4, 1917, 129. Notes on chalcid flies, chiefly from California [7 newl], 189, ix, 8-12. The No. American species of *Euchrysis* females [1 newl], 411, xii, 14-15. A chalcid parasite of the pink boll worm [1 newl], 420, v, 5-6. Rohwer, S. A.—Two bethylid parasites of the pink boll worm [1 newl], 420, v, 1-3.





PENES, *LEGION PROTONEURA* (ZYGOPTERA, ODONATA).—KENNEDY.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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No. 7.

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Notes on the Penes of Zygoptera (Odonata).

No. 8. The Penes in Neoneura and Related Genera.

By CLARENCE HAMILTON KENNEDY, Cornell University,
Ithaca, New York.

(Plates XXI-XXIII.)

In the first* of this series of articles was shown a series of penes in the genus *Acanthagrion*, whose divergent characters showed but little generic cohesion, a series with such abrupt changes in form from species to species that their characters could not be used in defining generic limits though they were exceptionally valuable in differentiating species.

In the second paper† was shown a series of penes in the Hawaiian genus *Megalagrion*, in which, though the genus included forms of diverse venation, size and body structure, the penes ran so close to each other in structure that the entire series of over twenty could not be divided into groups and

* Ent. News, xxvii, pp. 325-330, pl. XVIII, July, 1916.

† Ibid, xxviii, pp. 9-14, pls. II, III, Jan., 1917.

the penis could not be used as a specific character because of the lack of sufficient specific differences.

The present paper deals with a third condition, one that can be said to be intermediate between the preceding. It deals with a group in which the penis is a good generic as well as a good specific differential. As in the second paper, this group was chosen because of its immediate availability through Mr. Williamson's review of the genus *Neoneura* and his recent work on related genera.* It is offered as a supplement to his delimitation of genera and species in this Legion.

As in venation, the penis in the Legion Protoneura is reduced to a comparatively simple form, though it is not as reduced as in the Legion Lestes. Notwithstanding this reduction, ample variety of form yet occurs for the distinction of genera and species. By referring to the description and text-figure in my first article (*loc. cit.*) it will be seen that the penis in this group approaches nearly to this simple, generalized form. In most genera of the Legion Protoneura the terminal fold is lacking, though even this occurs in the genera *Palaemnema* and *Platysticta*, while it appears in a less degree in *Disparoneura*, *Caconeura* and *Isosticta*.

In the first series of figures accompanying this article are shown the penes (as far as I have been able to obtain them) of the type species in the greater number of the genera now accredited to this Legion.† With each, where possible, is shown the penis of a second species in the same genus to show at a glance those characters common to the two (generic characters) and those characters peculiar to the individual (specific characters). In the second series of figures are shown the penes of the species of the genus *Neoneura*.

*Notes on Neotropical Dragonflies or Odonata, Proc. U. S. Nat. Mus., Vol. 48. May 12, 1915, pp. 616-636. A new Dragonfly genus of the Legion Protoneura. Ent. News, Vol. xxvii, pp. 30-33, Jan., 1916. The genus *Neoneura*. Trans. Amer. Ent. Soc. xliii, pp. 211-246, pls. ix-xix, 1917.

†I am indebted to Mr. Philip Munz, who is working out the venational problems in the Zygoptera, for his list of these genera.

In a review of the penes in the first series one can readily see that good generic as well as specific characters exist, a condition different from that which was found in *Acanthagrion* on the one hand and equally different from the opposite condition found in the penes of the Hawaiian Zygoptera. Also the penes in this group show certain characters in common which might induce one, not familiar with the penes of the other Zygoptera, to attempt a definition for the group. Unfortunately many parallelisms occur in the form of this organ in the various genera, so that in using the characters of the penis to untangle classification the form of the penis has always to be considered in conjunction with any and all other available characters.

Among the startling parallelisms is the resemblance between the penes of *Palaemnema* and *Bayadera* the latter of which is in the Agrionidae, [Calopterygidae] another family of the Zygoptera. Certain species in *Disparoneura* (not figured in this series) have penes almost identical with that of *Amphipteryx* and nearly every one of the other generic forms can be paralleled in the Legion Coenagrion. The forms illustrated here are given merely to show a series in which the penis can be used to aid in the definition of genera. In this series, however, the penes show two or possibly three lines of evolution, which on a more complete study of the genera involved may show groupings within the Legion. Mr. Williamson has even suggested that this Legion may be an unnatural group, being merely the association of those forms of reduced venation, which have developed independently in various other Legions. The evidence for and against this will be given in a later paper after a more thorough study of this group has been made.

The following notes point out what may be considered generic characters in the genera illustrated.*

Palaemnema paulina Drury, figs. 1-2, genotype. Both soft folds present. Segment 3 two-lobed, the tips flattened into incurved hooks.

* The arrangement of genera used by Kirby, Cat. Odonata, London, 1890, has been followed.

Platysticta maculata Selys, figs. 5-6, genotype. Similar to *Palaemnema*, but the tips of the lobes of segment 3 not widened and flattened.

Disparoneura glauca Burm., figs. 9-10, genotype. Both soft folds present, the terminal fold short. Segment 3 four-lobed, the basal lobes spine-like.

Caconeura dorsalis Selys, figs. 13-14, genotype. Both soft folds present, the terminal fold short. Segment 3 four-lobed, the basal lobes long and flat.

Nososticta solida Selys, fig. 17, genotype. No terminal fold. Segment 3 four-lobed, the basal lobes narrow, perpendicular to the segment.

Isosticta simplex Martin, figs. 18-19. Both folds present, the terminal fold short. Segment 3 with two terminal lobes whose apices are chitinized and turned dorsad.

Neosticta canescens Tillyard, figs. 20-21, genotype. Segment 2 broader than segment 3, otherwise as in *Isosticta*.

Idioneura ancilla Selys, figs. 22-23, genotype. No terminal fold. Third segment simple, tips rounded. The internal fold reduced to a soft spine.

Microneura caligata Selys, figs. 24-25, genotype. No terminal fold. Segment 3 entire, in cross section deeply V-shaped.

Protoneura capillaris Ramb., fig. 26, genotype. Similar to penis in *Microneura*, but segment 3 with lateral apical lobes projecting caudad.

Epipleoneura lamina Williamson, fig. 29, genotype. Terminal fold bilobed, segment 3 with an apical notch.

Phasmoneura olmyra Williamson, figs. 32-33, genotype. Similar to the penis in *Microneura*, but segment 3 with an apical notch.

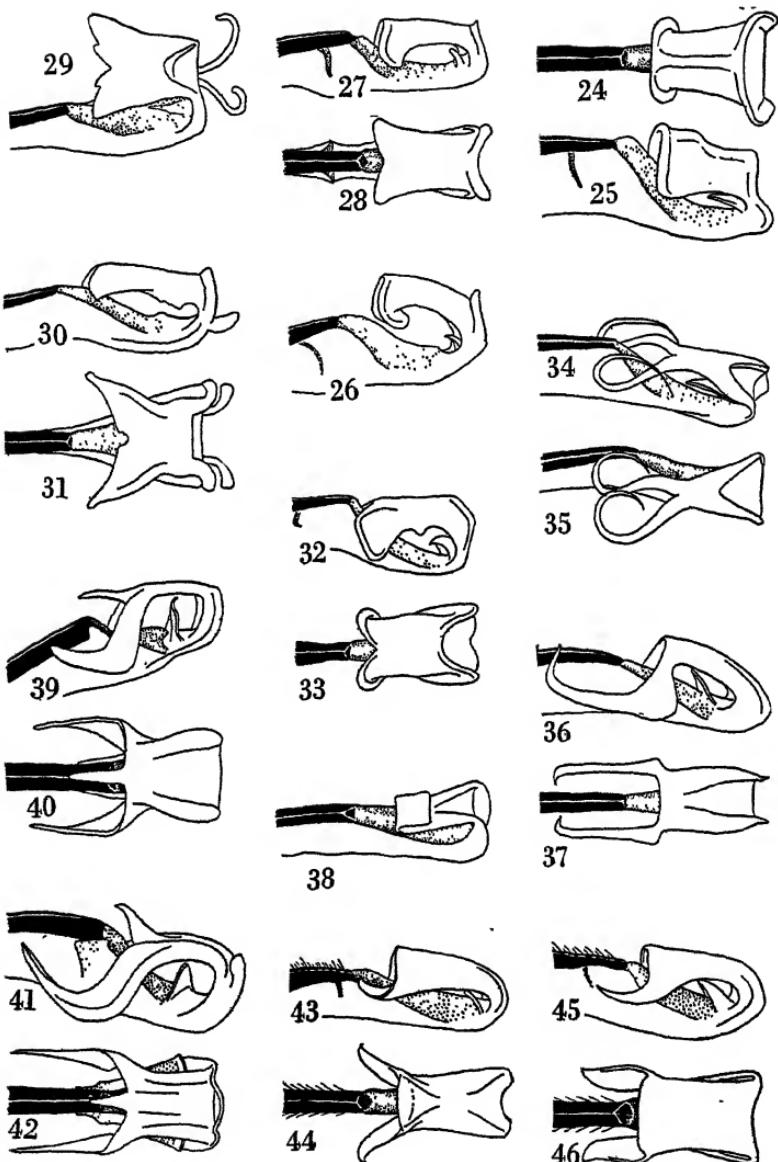
Psaironeura remissa Calvert, figs. 34-35, genotype. No terminal fold. Segment 3 divided apically into two attenuate lobes.

Epipotoneura nehalennia Williamson, fig. 38, genotype. No terminal lobe. Segment 3 with a square tip apparently folded back. (This was so minute I was not certain of the exact form of segment 3.)

Selysioneura cervicornu Forster, figs. 39-40, genotype. Terminal fold very short or wanting. Segment 3 trilobed.

Neoneura bilinearis Selys, figs. 43-44, genotype. Similar to *Protoneura*, but the lateral apical lobes pointing cephalad.

The second series of illustrations deals with the species in the genus *Neoneura*. In this genus the inner edges of the anterior lobes turn in. In *Neoneura rubriventris*, figs. 69-71, the apical lobes are reduced to mere rudiments. In *Neoneura mariana*, figs. 63-64, the terminal lobes are best developed. Usually they are pointed, but in *sylvatica* they have rounded tips. It is not necessary to go into detail concerning these as the illustrations show how a single type can appear variously modified in a series of congeneric species.



PENES OF NEONEURA (ZYGOPTERA, ODONATA).—KENNEDY.

In conclusion, while the penis in certain groups of Zygoptera has little value as a generic character, and in other groups has little value as a specific character, in this particular group of the Legion Protoneura it is of considerable assistance in defining both genera and species. As was stated at the beginning of this article, only a monographic study of the penis throughout the entire sub-order of Zygoptera can show what value to place on the penis in any group as a systematic help. In all the work this character appears to be suggestive rather than positive and final.

EXPLANATION OF PLATES XXI-XXIII.

Drawings of penes in the Legion Protoneura, being lateral and ventral views of the last two segments.

Figs. 1-2, *Palaennema paulina* Drury, genotype. El Fiscal, Guat., June 6, 1909, in coll. Williamson.

Figs. 3-4, *Palaennema angelina* Selys; Atoyac, Vera Cruz, Mex. May, H. H. S., in coll. Calvert.

Figs. 5-6, *Platysticta maculata* Selys, genotype; Ceylon, in coll. Hagen, M. C. Z.

Figs. 7-8, *Platysticta tropica* Selys; Ceylon, in coll. Hagen, M. C. Z.

Figs. 9-10, *Disparoneura glauca* Burm., genotype; Cap[e] in coll. Hagen, M. C. Z.

Figs. 11-12, *Disparoneura westermannii* Selys; Nilgiris, in M. C. Z.

Figs. 13-14, *Caconeura dorsalis* Selys, genotype; Lohabu, N. Borneo, in coll. Williamson.

Figs. 15-16, *Caconeura insignis* Selys; Java, Tilg., in coll. Williamson.

Fig. 17, *Nososticta solida* Selys, genotype; Queensland, in coll. Williamson.

Figs. 18-19, *Isosticta simplex* Martin; Sydney, N. S. W., coll. by Tillyard, in coll. Kahl.

Figs. 20-21, *Neosticta canescens* Tillyd., genotype. Tabalam, N. S. W., cotype, in coll. Kahl.

Figs. 22-23, *Idioneura ancilla* Selys, genotype; Brazil, Winthem, in coll. Hagen, M. C. Z.

Figs. 24-25, *Microneura caligata* Selys, genotype; Cuba, 1864, in coll. Hagen, M. C. Z.

Fig. 26, *Protoneura capillaris* Ramb., genotype; Portland, Jamaica, in coll. Calvert.

Figs. 27-28, *Protoneura calverti* Williamson; Tumatumari, Brit. Guiana, in coll. Calvert.

Fig. 29, *Epipleoneura lamina* Williamson, genotype; Wismar, Brit. Guiana, in coll. Williamson.

Figs. 30-31, *Epipleoneura fuscaenea* Williamson; Wismar, Brit. Guiana, in coll. Williamson.

Figs. 32-33, *Phasmoneura olmyra* Williamson, genotype; Rockstone, Brit. Guiana, in coll. Williamson.

Figs. 34-35, *Pstaireoneura remissa* (Calvert), genotype; Puerto Barrios (?), Guat., in coll. Williamson.

Figs. 36-37, *Pstaireoneura cerasina* Williamson; Wismar, Brit. Guiana, in coll. Williamson. Type.

Fig. 38, *Epipotoneura nehalennia* Williamson, genotype; Potaro Landing, Brit. Guiana, in coll. Williamson. Type.

Figs. 39-40, *Sclysioncura cervicornu* Förster, genotype, Gegagalu on Sattelberg, New Guinea, Carl Wahnes, in coll. Williamson.

Figs. 41-42, *Selysioncura cervicornu* Förster; Sattelberg, Carl W., in coll. Williamson.

Figs. 43-44, *Neoneura bilinearis* Selys, genotype; Wismar, Brit. Guiana, in coll. Williamson.

Figs. 45-46, *Neoneura carnatica* Selys; Cuba, Poey, 1864, in coll. Hagen, M. C. Z.

Figs. 47-48, *Neoneura aaroni* Calvert; Texas, in coll. Williamson.

Figs. 48-49, *Neoneura amelia* Calvert; Rio Liberia, Liberia, Costa Rica, in coll. Williamson.

Figs. 51-52, *Neoneura denticulata* Williamson, Iquitos, Peru, in coll. M. C. Z.

Figs. 53-54, *Neoneura esthera* Williamson; Diego-Martin Riv., Trinidad, in coll. Williamson.

Figs. 55-56, *Neoneura ethela* Williamson; Rio Grande do Sul, Brazil, in coll. Calvert (det. P. P. C. Ann. Car. Mus. VI, p. 212 as *rubriventris*).

Figs. 57-58, *Neoneura fulvicollis* Selys; Rio Cuyaba, Brazil (det. Calvert, Ann. Car. Mus. VI, p. 212), in coll. Carnegie Mus., Pittsburgh.

Figs. 59-60, *Neoneura joana* Williamson, Rockstone, Brit. Guiana, in coll. Williamson.

Figs. 61-62, *Neoncura maria* Scudd.; Cuba. Ch. Wright in coll. M. C. Z.

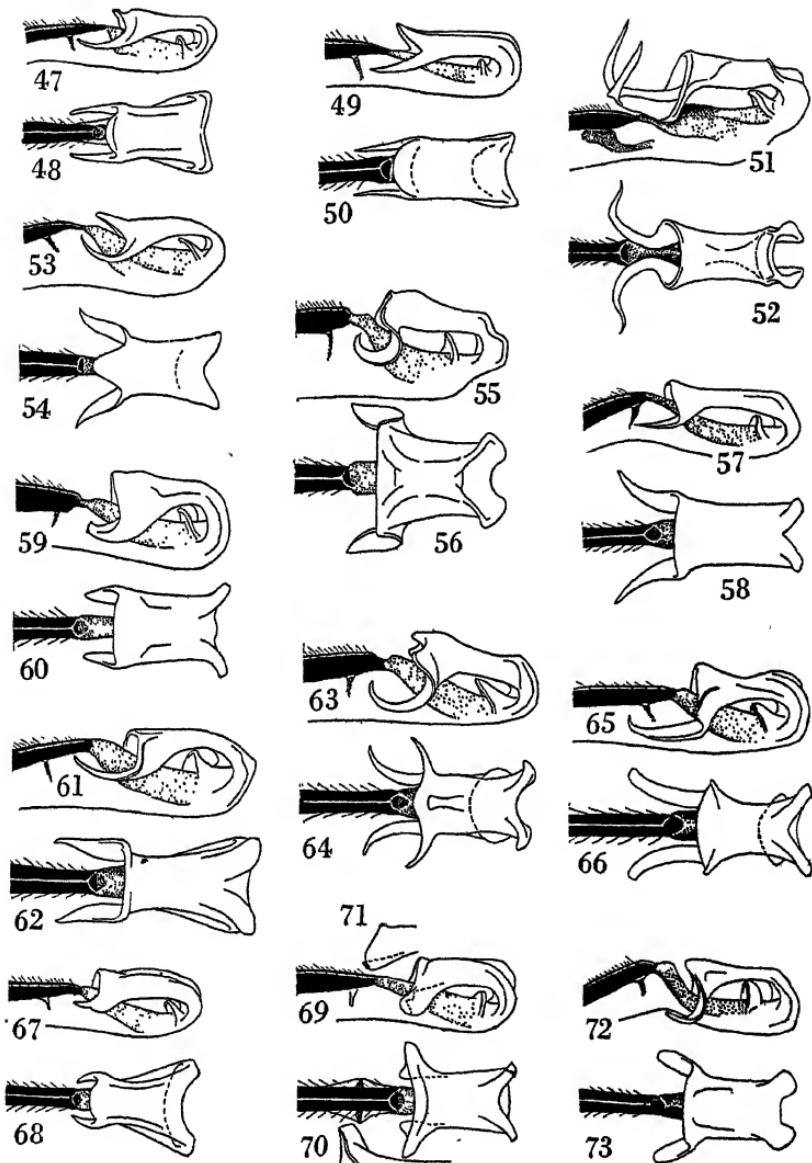
Figs. 63-64, *Neoneura mariana* Williamson; Tumatumari, Brit. Guiana, in coll. Williamson.

Figs. 65-66, *Neoneura myrthea* Williamson; Wismar, Brit. Guiana, in coll. Williamson.

Figs. 67-68, *Neoneura paya* Calvert; del Norte, Guat., in coll. Williamson.

Figs. 69-71, *Neoneura rubriventris* Selys; Tumatumari, Brit. Guiana, in coll. Williamson.

Figs. 72-73, *Neoncura sylvatica* Selys; Cachoeira, Brazil, in coll. Carnegie Mus.



PENES, LEGION PROTONEURA (ZYGOPTERA ODONATA).—KENNEDY.

Life History and Habits of the Margined Water Strider, *Gerris marginatus* Say (Hem., Het.).

By J. R. DE LA TORRE BUENO, White Plains, New York.

This species, *Gerris marginatus*, Say 1832, *lacustris* Kirby 1837 (sec. Van Duzee, Ch. L.), is the common smaller *Gerris* spread over all the United States, a familiar form on ponds and in the bays of lakes. It has been recorded in Canada from British Columbia to Quebec, and in the United States from Oregon and California to Georgia and Texas, but twenty-three States are still to be heard from, including the greater part of the Mississippi Basin.

Gerris marginatus belongs in the subgenus *Gerris sensu strictu* (= *Limnotrechus*) which contains the smaller members. This subgenus, however, presents intergrading forms with subgenus *Aquarius* among the exotic species, *Gerris chilensis* Berg forming the passage. The character of the first joint of the antenna shorter than the second and third taken together, in connection with the smaller size, serves to separate *Gerris* from *Aquarius*. Two species of the subgenus in the Eastern States may be confused with it, namely, *Gerris buenoi* Kirkaldy and *Gerris canaliculatus* Say. The former is smaller in size and has more pronounced abdominal sutures together with a flavescent marginal line on the anterior prothoracic lobe. The second species, while it may be larger or smaller, has a distinctly more slender form and noticeably long and slender legs and antennae. The genital character controls; it is well-figured by Parshley¹. Weiss² experimented with *G. marginatus*, apterous, as to orientation to water, or, using the more technical expression, positive hydrotropism. He found that up to 9 yards distant from a pond they immediately made their way back: at 10 yards they began to experience difficulty; at 15, it increased, while at 30 or 40 yards they seemed to lose their bearings, moved aimlessly about and after a time seemed unable to find their way back to the water. The species is a

¹1915. Ent. News xxvii: 103, fig. b. ²1914. Can. Ent.: 33.

strong flier, and I have found it in ocean beach drift in July, on the shores of Long Island³. *Gerris lacustris*, so Griffini says⁴, touches the water at times with the abdomen, which it rests on the surface. I have not seen *marginatus* do this. He also states that it has been observed to be attracted by mirrors.

Gerris marginatus begins to oviposit early in the spring; the eggs hatch out in ten days to two weeks, depending on the temperature. After five molts it reaches the adult in from 5 to 6 weeks. Unlike its larger congener *remigis*, it is a dweller in still waters by preference. Here at times it gathers in large numbers. In strong winds it hugs the shore, particularly if it blows that way. From early March to late November it may be found busy about its domestic affairs. The height of its abundance is between April and September. In early April they have been noticed mating; by May 20 to 26 adults and nymphs in one or two stages are seen together, and so through June and July, when they are found in several stages together. Its food is the same as that of *remigis*, except that being smaller it is not able to overcome quite such large insects. I have seen *marginatus* trying to capture *Notonecta undulata* which had flown to a pond and was on the surface struggling to submerge. The *Gerris* avoided reprisals by jumping up from the surface. On the other hand, it is one of the few water-bugs that fall a prey to frogs, and is, in fact, the only one I have seen recorded.

Its structure is characteristic of the genus; in fact, belonging in the typical subgenus, it closely approaches the generic and subgeneric type, *Gerris lacustris* Linné. In common with this species, *marginatus* rejoices in the phenomenon of pterygopolymorphism. Kirkaldy says⁵: "lacustris has provided me with more variations—at least six—than any other species. It is noteworthy that in the brachypterous forms, the two abbreviated elytra are not always equal in length and develop-

³1915. Ent. News xxvi: 277.

⁴1894. Gli Insetti Acquaioli p. 39.

⁵1899. Entomologist, xxxii: No. 432: p. 109.

ment in the same specimen." *Gerris marginatus* exhibits the same gradation from apterous to macropterous, going from one to the other by imperceptible degrees. Yet it is essentially an alate species, since the bulk are fully winged and only a small number totally apterous, with an indefinite proportion of varying degrees of brachypterusness. In this it differs from *remigis* and other species of the subgenus *Aquarius*, which are in general totally apterous with a very small number—an occasional specimen here and there—fully winged (except *conformis*, always found fully winged, and *alastor* Bueno MS., nearly always with rudimentary wings only). The most complete study of pterygopolymorphism is Reuter's "Poly-morphisme des Hemipteres⁶." Here he covers the entire subject and hazards explanation based on selection. In *Gerris marginatus* and in general in the family, I see a gradual transformation to apterousness, through disuse, as exemplified by our *remigis* and the European *najas*, the fully winged being the primitive form, adapted to an existence on the water from an antecedent Reduvioid land bug, whose mobility depended on these members. The stream species, being in general safe from the consequences of droughts, are so independent of wings for transportation that these organs are nearly gone in most of them. The species inhabiting land-locked bodies of water must, however, always have some means of travelling if the water on which they live dries up, as so frequently happens with small ponds or water-holes. Hence wings still normally persist in these forms.

Structure, progression, respiration, reproduction are as in *G. remigis*. Dufour (op. c., p. 199), states that in *paludum* the digestive system is as in *canarium*, excepting the salivary gland.

Gerris marginatus, so far as known, has no egg parasites. Adults and nymphs are sometimes found with larval mites attached as in *remigis*, particularly about the head and thorax.

Egg. The egg is cylindrical, truncate at one end and round-

⁶1875. Bull. Soc. Ent. Fr., pp. 225/36.

ed at the other. The chorion is roughly shagreened, and under magnification $\times 975$, shows very shallow pits. It has no indications of a lid or line of weakness along which to split. Length, 3 mm.; diameter, 1 mm.

The ova are clear white when first deposited, but change to brown as development of the embryo progresses. In hatching, the nymph emerges through a longitudinal split beginning at the truncate end and running about one-half to two-fifths the length of the egg. Three females gave 30 ova in four days. They were fastened a few on top of a piece of cork in the aquarium, and most in a clear colorless glue or jelly, along the edges of the cork and under the surface of the water. Garman⁷ says the eggs are attached to aquatic plants. Dufour remarks (op. c., p. 347) "I have kept in vessels of water with water plants pregnant females of *Gerris paludum*, and I have assured myself they deposit their eggs one after the other, but not in contact, in a kind of mucilaginous jelly."

After eight or nine days the little bugs emerge. On June 9, one year, I secured thirty nymphs. Some seemed to molt right away, which I assume to be casting the amnion. In this connection, Dufour also says (1. c.) "I have seen the larvae born and I have sometimes found caught in the opening of the egg a fine membrane which was doubtless the immediate envelope of the larva, or which covered the interior of the egg-shell."

This pellicle cast by *Gerris marginatus* immediately on emerging covers the body legs and antennae, and is extremely hairy. It is so soft it loses its shape completely, although all the joints of antennae and legs are apparent and the tibial combs are all visible. All the tarsi, on emerging, are 1-jointed; all claws subapical; the antennae are very stout, the last joint as long as the others put together, and so far as could be seen in balsam mounts, apparently 3-jointed only. The lancets are also cast with this skin.

It is an open question in my mind whether or not this may

be considered a true molt. There are no perceptible differences between this nymph and the next, either as to size or structure, except the possible 3-jointed antennae noted. I am inclined to consider it akin to the subimago molt of the mayflies, rather than as a true ecdysis. This amnion, for want of a better term, resembles that covering certain Orthoptera, except that it is a complete pellicle. If it is a true molt *marginalis* has six. It may well be that this initial molt has gone unnoticed in the other Heteroptera, owing to the very diaphanous skin being blown away as soon as cast, and, in water, being unseen through its transparency and quickly destroyed by the mechanical action of the element.

First Instar. On emerging the nymph is about 1 mm. long, pointed oval in shape. The cylindrical antennae are $2/3$ the length of the body, the first joint as long as 2 and 3 together, and 4 as long as the other three. The head is translucent honey-yellow, quite wide between the eyes, which are small, prominent, round and black. The rest of the insect, including the legs, which are rather thick in proportion to the size, is translucent white. There is a broad black stripe down the middle which crosses a similar stripe on the thorax and ends in a point at its cephalic margin. The abdominal segments are variously marked by the same black bands around the abdomen at the connexivum. The dorsum only is described, as it was taken from a living specimen.

The tibia of the anterior pair of legs is longer than the femur and of the second pair as well, but in the third pair, the femur is longer. The anterior tarsus is short and stout and the two other slender and long; all are single-jointed, with subapical claws. All the tibiae have combs. The rostrum is 4-jointed, stout, joints 1 and 2 subequal, shortest, 3 longest, 4 longer than either 1 or 2, tapering; no tactile hairs were noted at the tip. The legs are set very far back, which means that the abdomen is very short, the abdominal segments being narrow. The thorax is about 4 to 5 times as long.

In molting the vertex and front lift off like a lid hinged at the clypeus, and the thorax splits straight down the middle. The lancets are cast with rostrum, and there are no signs of tracheae in the cast skins.

The second true molt takes place in 3 to 5 days.

Second Instar. The antennae in this instar have joint 4 shorter than the other three together, 2 and 3 being subequal, and 1 twice as long as either. The first pair of legs continues the shortest, the second is the longest; the middle femur and tibia are subequal, in the other two, the tibia is longer than the femur. The thorax is two and a half times

as long as the abdomen, which has 7 and one genital segments. The prothorax is distinct.

Varying from 3 to 5 days, the bug molts for the second time.

Third Instar. The antennae continue to change. The 4th joint is still the longest, 3 the shortest, followed by 2 and 1 in the order given. The eyes are reniform. In the legs, the femora are longer than the tibiae in the 1st and 3rd pairs, and subequal in the second. The abdomen is longer and the legs appear set less far back. In other respects there are no perceptible changes.

The third molt follows the second in 3 to 6 days.

Fourth Instar. In this instar the antennae continue to change, and the differences in length are not so great; joint 4 is still the longest, but 2 and 3 are subequal and the shortest, 1 being not greatly shorter than 4. The femur and tibia of the anterior legs are subequal; and the femur is longer in the 2d and 3d pairs. The hind femora have dark spots from which arise long setae. The abdomen has further increased in length, the segments being wider and more distinct. Joint 3 of the rostrum is the longest, 2 is the shortest and 4 is as before, and nearly equal to 1. All tibiae have combs and all claws are simple.

The fifth instar is reached in 3 to 5 days.

Fifth Instar. In this instar the form and general appearance of the nymph begin to approach more closely to the adult. The head is rounded and set with long setae, the eyes are reniform. In the antennae joints 1 and 4 are subequal, and longer than 2 and 3, which are also subequal. The chief antennal difference is at the base of the third antennal joint which has a pedicellate appearance. The rostrum is the same as before, except that the 3d joint is much longer in proportion. The prothorax is differentiated and the mesothorax distinct, with a minute scutellum. The wing-pads are notable and reach half-way to the 4th abdominal segment. The legs are as before, with thicker femora than tibiae. The second and third femora have the dark setigerous spots, and the third in addition is set with spines. The middle tarsi are much elongate, and all the tarsi continue single-jointed. Abdominal segments are very distinct and the two genital segments very prominent. In the cast skin two long slit-like spiracles are seen in the mesothorax in front of the intermediate coxae.

In five to seven days the little bug molts for the fifth and last time, and reaches the adult. The chief changes in structure in the external skeleton are the two-jointed tarsi, the node at the base of the third joint of the antennae, the much larger eyes in comparison to the head and the prothorax and mesothorax fused together.

The entire internal anatomy of *Gerris marginatus* is still to be worked out, and the external organs of respiration as well.

These are the detailed instars and molts of the specimens it was possible to breed to maturity. It is to be noted that these transformations represent an extreme as all conditions were favorable. There was the warmth of summer and an abundance of food, even though it changed not at all from day to day.

GERRIS MARGINATUS—LIFE HISTORY.

Ova Deposited	Embryo Period	Emerged Date	Instar I	Molt I	Instar II	Molt II	Instar III	Molt III	Instar IV	Molt IV	Instar V	Molt V
No. 1 ?	?	June 29-07	8 days	July 7	3 days	July 10	4 days	July 14	3 days	July 17	6 days	July 23
No. 2 ?	?	"	8 "	"	3 "	" 10	6 "	" 16	4 "	" 20	7 "	" 27
No. 3 ♀ June 1-08	8 days	June 9	7 "	" 16	4 "	" 20	3 "	" 23	4 "	" 27	6 "	" 8
No. 4 ♂ June 1-08	8 "	"	7 "	"	5 "	" 21	3 "	" 24	4 "	" 28	6 "	" 4
No. 5 ♀ June 1-08	8 "	"	7 "	"	4 "	" 22	4 "	" 24	5 "	" 29	5 "	" 4
No. 6 ?	?	June 25-07	8 "	" 3	4 "	" 7	2 "	" 9	7 "	" 16	6 "	" 22

No. 1—Emergence to adult, 24 days

No. 2—" 25 " One of 45 ova deposited by one female.
" 3—Oviposition " 33 "
" Emergence " 25 "
" 4—Oviposition " 34 "
" Emergence " 26 "
" 5—Oviposition " 34 "
" Emergence " 26 "
" 6—" 27 "

These life histories give a period of between 33 and 34 days for the full transformations from the egg to the adult, and of between 24 and 28 days for the five nymphal instars.

Briefly, then, *Gerris marginatus* has one embryonic, 5 nymphal (or if the first tenuous molt be considered a true ecdysis, 6), and one adult, a total of seven instars, which take about a month. This would allow for three broods a summer.

Feeding Habits of Adult Chrysopidae (Neur.).

I have taken adult Chrysopidae (*Chrysopa* sp.) on flowers with exposed nectar: *Pastinaca sativa*, June 15 and 24, 1886; *Tiedemannia rigida* (*Oxypolis rigidior*), Aug. 15, 1888. These visits were mentioned under Neuroptera in Trans. St. Louis Acad. Science 5: 459. They are not cited by Knuth, *Handbuch der Blütenbiologie*, III. 2: 469, but visits of a *Chrysopa* sp. to *Yucca whipplei* are there recorded.—CHARLES ROBERTSON, Carlinville, Ill.

Some Bees of the Genus *Psaenythia* (Hym.).

By T. D. A. COCKERELL, Boulder, Colorado.

Many years ago Professor L. Bruner collected three species of the wasp-like Panurgid genus *Psaenythia* at Carcarana, Argentina. They were sent to the National Museum, and are now in my hands for determination. One proves to be a female of *P. picta* Gerst., but the others are considered new.

Psaenythia thoracica *crawfordi* n. subsp.

Larger than true *P. thoracica* from Paraná, about 8.5 long in both sexes; female with lower border of clypeus black, and the black on disc extending upward as two large wedge-shaped marks; supraclypeal area black; mesothorax, scutellum, postscutellum and two transverse marks on basal part of metathorax red; pale yellow abdominal bands narrowly interrupted on first two segments, constricted but not interrupted on third and fourth, very narrowly interrupted on fifth. Male with face cream-colored below antennae, the supraclypeal mark notched above; anterior margin of mesothorax broadly black; no red on metathorax; all the abdominal bands interrupted.

The female, in my collection, was received from the National Museum, labelled *P. thoracica* Gerst. by Mr. Crawford. The male (Bruner 33) evidently belongs with it. In spite of the greater size, I should not separate this from *P. thoracica* (described from the male), but for the fact that Friese has the female of that insect (from Villa Rica, Paraguay), and states that the abdomen has on each side of segments 1-5 a small yellow three-cornered spot. Since Friese's insect is from a region comparatively near the type locality, there is no reason to doubt that it represents the species correctly; *P. thoracica* *crawfordi* is evidently a well-marked subspecies from the desert regions of the interior.

Psaenythia pachycephala n. sp.

♂.—Length about 10 mm., robust; head very broad; eyes rather small, green, strongly diverging below. Black, with clear ferruginous legs, the markings cream-color, those on face and mandibles lemon-yellow. Mandibles long, yellow on outer face except at apex; clypeus (which is extremely broad and low), labrum, large dog-ear marks, and space between clypeus and dog-ear marks and orbits yellow, the lateral yellow ending above horizontally, not quite reaching level of top of dog-ear marks; a cream-colored mark on upper part of each

cheek behind; facial foveae oblique; vertex shining but well punctured; flagellum clear ferruginous beneath except at base, antennae otherwise nearly black. Mesothorax and scutellum shining and sparsely punctured, metathorax dull; cream-colored markings consisting of interrupted line on collar, ends of tubercles, spot behind tubercles, spot at each anterior corner of scutellum, band on postscutellum, spots on knees (extending to stripes on anterior femora), and bands on abdominal segments 1-6, on first segment reduced to a pyriform mark on each side, on second and third broadly interrupted, on fourth narrowly interrupted, on fifth and sixth hardly more than constricted; tegulae clear fulvous; wings yellowish, dusky apically, stigma amber-color; apical plate of abdomen broadly truncate, the truncation slightly excavated. (Bruner 59.)

♀.—Length about 10 mm.; differing from the male thus: Head ordinary, though broader than long; mandibles black, with a ferruginous patch; face black, except for a pair of large quadrate patches, broader than long, taking in the dog-ear marks and the space between these and the orbits; mesothorax and scutellum rather densely punctured; bands on first two abdominal segments rather broadly interrupted, on third narrowly, on fourth very narrowly, on fifth entire; fringe at end of abdomen black; spur of middle tibia as long as basitarsus, remotely short-pectinate. (Bruner 60.)

The sexual difference in the sculpture of the thorax is parallel with that observed in *P. philanthoides* Gerst.

Related to *P. rubripes* Friese, from which it is known by the much darker antennae, spotted scutellum, and the large light patches on face of female. According to the description, *P. rufipes* Holmbg. appears to be very similar, differing by the color of the flagellum and the form of the face-markings. Schrottky states that *rufipes* is a variety of *P. picta*, which *P. pachycephala* certainly is not.

Physiographic Divisions of the United States.

Entomologists studying geographical distribution will find useful a monograph by Nevin M. Fenneman, under the above title, forming pages 19-98 of volume VI of the *Annals of the Association of American Geographers*. It attempts "to divide the United States into natural or physical units which should be as nearly as possible homogeneous with respect to certain criteria..... All orders of divisions rest ultimately on existing differences in topography and elevation. But the differences considered are those which pertain to physiographic types and not merely superficial appearance." It is accompanied by a preliminary map of the United States 42.5 x 17 inches. Copies may be purchased for 26 cents from the Secretary and Editor of the Association, Prof. Richard E. Dodge, Washington, Connecticut.

Origin and Development of the Photogenic Organs of *Photuris pennsylvanica* De Geer (Col.).*

By WALTER N. HESS.

In spite of the fact that the light organs of fire flies have been the object of much study during the past century, comparatively little has been done on their development. However, during the past few years this phase of the subject has received more attention, though as yet, no one has definitely demonstrated their embryonic origin.

There are at present three conflicting views regarding the origin of the photogenic organs. One view is that they are modified hypodermal cells, another that they are formed from both ectoderm and mesoderm, and lastly, that they are derived from fat cells. Of these three views, that of the fat cell origin has been the most generally accepted.

Among the earlier workers who favored the idea of ectodermal origin was Owsjannikow (1868), but his observations are of little value since he studied only the adult organ.

The question of origin can be settled only by a study of the development of the photogenic tissues. With the exception of two recent papers, Vogel (1912), and Williams (1916), this has not been done by any one except Dubois. Dubois (1898) studied the development of both *Lampyris noctiluca* and *Pyrophorus noctiluca*. He believed that he was able to follow the development of the photogenic organs through the different stages, from the beginning of segmentation, to the adult insect. He discovered a close histological resemblance between the blastoderm cells and the photogenic cells of the larva, pupa and adult. Furthermore, he concluded that the cells of the hypodermis multiply, and by proliferation form directly the photogenic organ of the larva.

For some reason Dubois' work has attracted little attention and is practically ignored in general discussions of the subject. Moreover he misinterpreted the normal structure of the body wall in *Lampyris*, and for this reason his conclu-

* Contribution from the Entomological Department of Cornell University.

sions have been severely criticised by the few who have discussed them.

Wielowiejski (1890), in opposition to Dubois, states that the so-called reflective or urate layer of the photogenic organ is derived from fat cells; the light giving or luminous layer, on the contrary, is composed of cells derived from oenocytes, hence ectodermal. Here again the statements are based on a study of mature organs, and hence are not conclusive.

With the exception of the two previously mentioned papers by Vogel and Williams, all authors who favor the theory of fat cell origin have based their conclusions only on a study of the adult organs. Many of these, including Leydig (1857), Schultze (1865), Wheeler (1892) and Berlese (1909) seem to be of this opinion, largely because the structure of the mature organ resembles somewhat that of fat cells, and also because certain cells of the photogenic organs secrete urates and other products, comparable with fat cells.

Recently two important papers have appeared which apparently definitely settle the question in favor of the fat cell origin, one by Vogel (1912), the other by Williams (1916).

Vogel studied the embryonic development in *Lampyris noctiluca*, beginning with a stage in which the organ was already clearly differentiated. He made a comparative histological study of its cells and those of the neighboring tissues, from which he concluded that the cells of the photogenic organ, in this stage, agree with the neighboring fat cells in shape, size and relations of their nuclei. On this he based his conclusions that the light organ arises from fat cells.

It should be noted that Vogel found the organ in its early development closely applied to the hypodermis, while at a later stage it was definitely separated from it.

Williams (1916) worked upon our native species, *Photuris pennsylvanica*, and apparently confirmed completely the work of Vogel. He maintains that the cells of the photogenic organ form a gradual gradation from the rather dark pigmented cells lying against the hypodermis, through those on the side towards the fat cells and continuous with them.

Unaware of Williams' work, which did not appear until late December, the writer had undertaken a study of the embryonic development of the photogenic organs of *Photuris pennsylvanica*. This work was at the suggestion of Dr. W. A. Riley, to whom the writer is indebted for helpful advice and criticism in the completion of this paper. On the basis of this work he is forced to conclude that neither Vogel nor Williams studied the organ in its earliest development, and that they drew mistaken conclusions from observations of organs already developed beyond the critical stage.

Material for study was obtained by confining the adult insects in small jars that were partly filled with earth and moss. Since oviposition occurred very readily in captivity, it was easy to obtain a complete series of eggs by removing the insects to different jars each day. During the summer of 1916 the eggs of this species hatched in from 25 to 27 days, depending on temperature, with an average of 26 days. Eggs were killed in hot water, dehydrated and imbedded in paraffin. Sections were cut three and four microns thick. As it was often difficult to find the eighth abdominal segment, sagittal sections were by far the most satisfactory. Heidenhain's iron haematoxylin was very satisfactory for staining. Various other stains were tried with less success. Eosin was sometimes used as a counter stain.

It was found in the 14-day embryos, that the hypodermis on the ventro-lateral portion of each side of the eighth abdominal segment, in its anterior region, showed a definite thickening, due to proliferation and enlargement of the cells, as shown in Fig. 1, (H). The nuclei of the cells were also larger than those of other hypodermal regions.

In the 15-day embryos the organ appeared as a distinct nodule which projected from the inner surface of the hypodermis (Fig. 2, P). At this stage there was no evidence of any separation from the hypodermis. In fact the hypodermal cells extended up slightly between the cells of the nodule itself.

By studying a large number of embryos it was definitely

determined that there was no evidence of any relation between the fat cells and those of the nodule, in this, or the 14-day embryos. At this age the cells and nuclei of the nodule are much larger than those of the hypodermis. In fact they somewhat resemble the fat cells, though the nuclei are larger. Moreover, the chromatin in the nuclei of the photogenic organ is of a coarse irregular nature resembling closely that of the

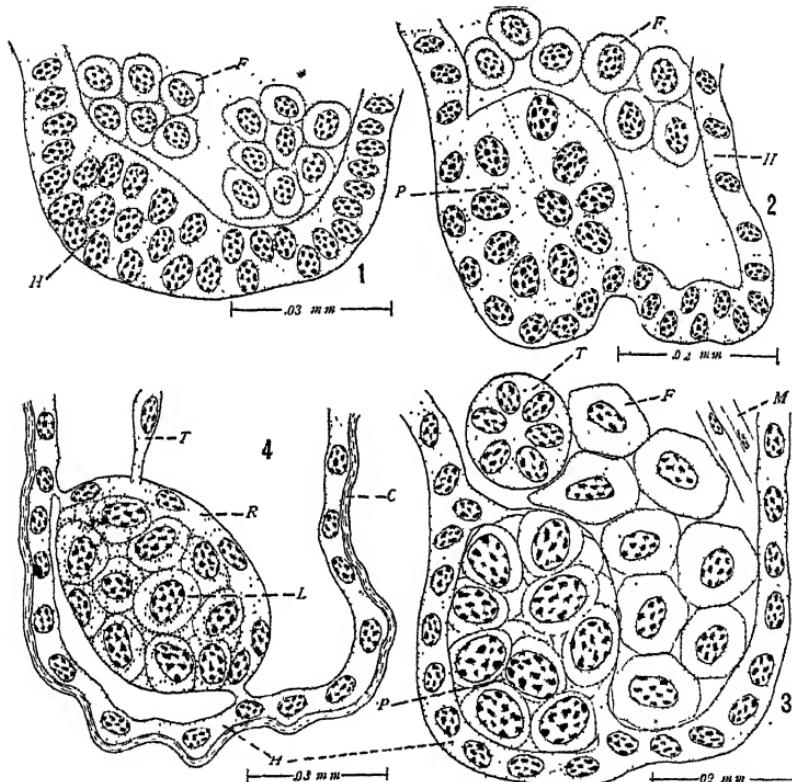


Fig. 1.—Sagittal section of the ventro-lateral eighth abdominal segment of a 14-day embryo through the middle of the photogenic organ. *F*, fat cell; *H*, hypodermis thickening to form the photogenic organ.

Fig. 2.—Sagittal section of the ventro-lateral eighth abdominal segment of a 15-day embryo through the middle of the photogenic organ. *F*, fat cell; *H*, hypodermis; *P*, photogenic organ or nodule.

Fig. 3.—Sagittal section of the ventro-lateral eighth abdominal segment of a 17-day embryo through the middle of the photogenic organ. *F*, fat cell; *H*, hypodermis; *M*, muscle; *P*, photogenic organ; *T*, trachea.

Fig. 4.—Sagittal section of the ventro-lateral eighth abdominal segment of a 26-day embryo through the middle of the photogenic organ. *C*, cuticula; *H*, hypodermis; *L*, luminous layer of photogenic organ; *R*, reflective or urate layer; *T*, trachea.

hypodermal cells, rather than that of the fat, which is of a finer nature. The cells of the light organ at this stage appear somewhat vacuolated, especially those farthest away from the hypodermis. This fact is not surprising since this portion soon forms the less dense or reflective layer. The hypodermis itself often shows a vacuolated condition.

In the 16- to 17-day embryos the organ is completely separated from the hypodermis, except at its two ends where it remains attached, the organ being elongated in the direction of the two attachments. The appearance of the photogenic cells at this stage is very similar to that of the 15-day embryos, except that their cell boundaries seem more distinct. However the cells farthest away from the hypodermis appear more vacuolated. Until now, cell division has been but slight, however at this time these large active nuclei are dividing considerably.

From Vogel's and Williams' descriptions of the earliest condition of the light organs that they observed, one would be led to believe that it was the study of this stage of development on which they based their conclusions regarding its origin. At this time the fat cells lie in rather close proximity to the light organ, and somewhat resemble it.

In embryos 19 to 20 days old, there occurs a differentiation of the cells of the photogenic organ, by which the two layers are formed. The tracheal and nerve connections become fully established about this time, for in the 22-day embryos light was being emitted from the photogenic organ.

In the 26-day embryos (Fig. 4,) the two layers are very distinct. Cell boundaries were definitely observed in the luminous layer, though no cell walls were distinguished in the reflective area. At this period there is considerable difference in the nuclei of the two regions. Those of the reflective layer appear smaller and more elongate than those of the luminous area. The cytoplasm of the luminous portion is very granular and appears slightly alveolar, while that of the reflective layer, though somewhat alveolar-like, contains comparatively few granules.

The narrow hypodermal ligaments which are continuous with the hypodermis and the photogenic organ, often appear longitudinally striated, due probably to a slight modification of the hypodermis in those regions. In a sagittal section these attachments are continuous longitudinally with the reflective layer, the region between these attachments next to the hypodermis being occupied entirely by the luminous cells. Since the reflective layer lies like a cap over the inner portion of the photogenic organ, its cells cover all of the organ except that portion next to the hypodermis.

At the meeting of the American Society of Zoologists, at New York, in December, 1916, Dahlgren reported observations which he had made on the development of the adult organs in the pupa of *Photuris pennsylvanica*. He found that the larval organs degenerated, and that new ones were formed, in different body segments, by the proliferation of hypodermal cells. Williams in his work on the development of the light organs in the pupa concludes that they are derived from fat cells. However he states: "The photogenic organ, when in the process of formation, frequently suggests a hypodermal origin, for it is then rather structureless and closely applied to the body wall. Indeed some sections show the hypodermis sending up extensions between the cells of the organ." My observations on the pupal development of the photogenic organ, though essentially the same as quoted from Williams' paper, have led me to conclude, as Dahlgren, that the adult organs in the pupa arise from hypodermis.

Wheeler and Williams (1915) in their study of a mycetophilid fly of the New Zealand caves, find that the light organs are a modified portion of the Malpighian tubules. These structures, as is well known, are of ectodermal origin, and this furnishes a clear instance of light organs from the ectoderm in insects.

All the evidence which I have obtained from the studies above outlined, strengthen my belief that Vogel and Williams were mistaken in their interpretations of the early light organ, and that, instead of arising from fat cells, the em-

bryonic organ is formed by a proliferation of hypodermal cells, which are ectodermal in origin.

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An Active Ant-killer (Arach., Solpugid.).

April 25th of this year, Mr. Frank B. Richardson, of San Diego, Texas, sent me a specimen of an interesting Solpugid, *Eremobates magnus* (Hancock), which was determined by Mr. Clarence R. Shoemaker, of the National Museum. Mr. Richardson found the specimen destroying large sized ants. He took it to an ant hill, and in a few minutes it killed "hundreds of ants." Mr. Richardson pointed out that these ants are a great pest at San Diego and especially to freshly planted seeds. He stated that they had carried away about 20 pounds of grass seed which he recently sowed. He further stated that he would very much like to "promote the multiplication" of this important ant enemy.—L. O. HOWARD, U. S. Bureau of Entomology, Washington, D. C.

Notes on the Earwigs (Dermaptera) of North America, north of the Mexican Boundary.

By MORGAN HEBARD, Philadelphia, Pa.

The Philadelphia collections contain material of all the species of Dermaptera native to, or adventive in, these regions. It is the purpose of the present paper to list the native species, giving their synonymy and in each case the first incorrect use of a name for the species based on material from the regions here considered; to record hitherto unreported material before us, and to give briefly the local habitat and known distribution of each species. One new species is described. The nomenclature shows but little recent change; *annulipes* having been transferred by Burr from *Anisolabis* to *Euborellia*, while the series now at hand prove beyond question the distinctness of the species of the Unidentata Group of the genus *Prolabia* found in Hayti and in the southeastern United States, the correct name for the latter insect being *pulchella* of Serville.

Though the different North American species have been frequently mentioned in the literature, few studies in any way comprehensive have appeared.¹

The order is but weakly represented in the regions here treated, except in the subtropical and tropical areas of the southern United States, and constant field work has been necessary to assemble even the small total here recorded.

Fifteen species are represented, of which four may be said to be confined in distribution to the restricted tropical areas

¹Of these the most important are:—

1876. Brief Synopsis of North American Earwigs, with an Appendix on the Fossil Species, by Scudder. Bull. Geol. Geogr. Surv. Terr., II, pp. 249-260.

1911. The Earwigs of the United States National Museum, by Burr. Proc. U. S. Nat. Mus., XXXVIII, pp. 443-467.

1913. Notes on Nearctic Orthopterous Insects. I. Nonsaltatorial Forms, by Caudell. Proc. U. S. Nat. Mus., XLIV, pp. 595-599.

1914. United States and Mexican Records of Species of the Genus *Doru* (Dermaptera; Forficulidae), by Rehn and Hebard. Jour. N. Y. Ent. Soc., XXII, pp. 89 to 96.

of the southern United States, while two are found only in the subtropical desert of the southwest. A total of 432 specimens is recorded, of which 309 belong to the Philadelphia collections.

Our thanks are due to those who have assisted in permitting the examination of material, either their own property or in their care.

LABIDURIDAE.

PSALINAE.

1. *Anisolabis maritima* (Géné).

1832. *Forficula maritima* Géné, Sagg. Monogr. Forfic. Indig., p. 9. [Nice, France; Genoa and Tuscany, Italy; along Mediterranean.]

1853. *Anisolabis maritima* Fieber, Lotos, III, p. 257. [Exotic records; South Carolina.] (Generic assignment and first United States record.)

New York: Larchmont, XI, 27, 1902, (T. D. O'Connor), 1♂, [Hebard Cln.].

New Jersey: Palisades, 1901, (E. Daecke), 2♀, [A. N. S. P.].

Florida: Long Boat Key, 1♀, [Hebard Cln.]; Key West, (Agassiz; Morrison), 6♂, 8♀, [M. C. Z.]; Warrington, VIII, 4, 1903, (A. P. Morse), 1 juv., [Morse Cln.]; Fort Barrancas, VIII, 3, 1903, (A. P. Morse), 2 juv., [Morse Cln.].

Texas: Virginia Point, VII, 21, 1912, (M. Hebard; common under boards among low grasses on raised beach), 4♂, 3♀, 1 juv., [Hebard Cln.].

This insect is found under litter on the ground. It is usually met with in the largest numbers under drift on sea beaches. The species does not appear to exist far from salt water. It is generally distributed along the Gulf coast and the Atlantic coast as far north as Maine.

2. *Euborellia annulipes* (Lucas).

1847. *Forficelisa annulipes* Lucas, Bull. Soc. Ent. France, (2), V, p. LXXXIV. [Jardin des Plantes, Paris; probably introduced from North America.]

1905. *Anisolabis annulipes* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1904, p. 778. [Thomasville, Georgia.] (First United States record.)

1905. *Anisolabis asteca* Caudell, Ent. News, XVI, p. 216. [Jacksonville, Florida.]

1915. *Euborellia annulipes* Burr, Jour. R. Microsc. Soc., 1915, p. 545. (Generic assignment.)

Georgia: Tybee Island, VI, 20, (D. M. Castle), 1♂, 1♀, [A. N. S. P.].

Florida: Lake Worth, (Mrs. A. T. Slosson), 1♂, 1♀, [M. C. Z.]; Miami, III, 4, 1916, (M. Hebard; *Musa* Isle, orange grove, occasional under debris on sandy soil), 1♂, 3♀, 2 juv., [Hebard Cln.].

Alabama: Springhill, Mobile County, VIII, 25, 1915, (Rehn & Hebard; under signs on oaks), 1♂, 3♀, 3 juv., [Hebard Cln. and A. N. S. P.].

Mississippi: Agricultural College, (H. E. Weed), 2♂, 2♀, 3 juv., [A. N. S. P.]; Ocean Springs, I, 1905, (J. H. Comstock) 6♂, 6♀, 16 juv., [Cornell Univ. Cln.].

Louisiana: Nairn, XI, 1892, (H. E. Weed), 1♀, [A. N. S. P.].

Texas: Alvin, XI, 8, 1904, (Miss M. Hillje), 1♂, 1♀, [A. M. N. H.]; Laredo, VIII, 12, 1912, (M. Hebard; in drug store), 1♀, 1 juv., [Hebard Cln.].

Arizona: Phoenix, 1♀, [Hebard Cln.].

California: Folsom, VII, 19, 1885, 1♀, [M. C. Z.]; Mesa Grande, Sonoma County, IX, 30, 1906, (J. C. Bradley), 1♀, [Cornell Univ. Cln.]; Redlands, XII, 25, 1912, 1♂, 2♀, [Hebard Cln.]; Los Angeles, 1887, (D. W. Coquillett), 1♀, [Hebard Cln.]; Coronado, (F. E. Blaisdell), 2♂, 3♀, 1 juv., [Hebard Cln.].

This earwig is found under litter of every sort, sometimes under signs on trees and rarely in houses. It is more often found inland than under drift on sea beaches.

The species has been recorded from Philadelphia, Pennsylvania, and the District of Columbia; it should be considered adventive at these places. The species is now known from along the southern border of the United States, except in trans-Pecos Texas, New Mexico and eastern Arizona. The northernmost records, in addition to those given above, are: Raleigh, North Carolina; Camden and Columbia, South Carolina; Augusta and Macon, Georgia, and Montgomery, Alabama. It is generally distributed and numerous in southern Florida, the Florida Keys and southern coastal California.

LABIDURINAE.

3. *Labidura bidens* (Olivier).

1791. *Forficula bidens* Olivier, Encycl. Method., Ins., VI, p. 466. [Jamaica.]

1876. *Labidura riparia* Scudder (probably not *Forficula riparia* Pallas, 1773), Bull. U. S. Geol. Surv. Terr., II, p. 250. [Exotic records; Texas; Florida.] (First United States records.)

1905. *Labidura bidens* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1904, p. 777. [Thomasville, Georgia.] (Following Kirby's generic assignment, first United States record as *bidens*.)

1908. *Labidura erythrocephala* Burr, Bull. Mus. Hist. Nat. Paris, 1907, p. 512. [Savannah, Georgia.]

The description of *riparia*, from Siberia, is not sufficient to locate that species. It seems best to use the name *bidens* for the insect here considered until Siberian material can be obtained and the problem definitely solved.

Mississippi: Ocean Springs, I, 1905, (J. H. Comstock), 1♂, [Cornell Univ. Cln.].

Louisiana: Spanish Fort, New Orleans, VI, 29, 1916, (Lutz & Rehn; in pavilion), 2♀, 1 juv., [A. M. N. H. and A. N. S. P.].

Texas: Galveston, VII, 19, 1912, (M. Hebard; under board on sand near beach), 1♂, [Hebard Cln.]; Alvin, VII, 27, 1907 and XI, 8, 1904, (Miss M. Hillje), 1♂, 1♀, [A. M. N. H.].

This insect is usually found under litter on the ground. It frequently comes to light at night. It is often encountered under drift on sea beaches.

The species is widely distributed in Florida and southern Georgia, extending north along the Atlantic coast to Savannah. North of that point it is known only from a "South Carolina" record and one from Raleigh, North Carolina. Westward it is known only from the localities given above.

LABIIDAE.

SPONGOPHORINAE.

4. *Vostox brunneipennis* (Serville).

1839. *Psalidophora brunneipennis* Serville, Hist. Nat. Ins., Orth., p. 30. [Philadelphia, Pennsylvania.]

1876. *Spongophora brunneipennis* Scudder, (in part), Bull. U. S. Geol. Geogr. Surv. Terr., II, p. 252. [Exotic record; Pennsylvania; Kentucky to Florida; Texas².] (Generic assignment.)

1911. *Vostox brunneipennis* Burr, Deutsch. Ent. Nat.-Biblioth., II, p. 59. (New genus described with *brunneipennis* as genotype.)

North Carolina: Southern Pines, IV, 17, 1915, (A. H. Manee), 1♀, 2 juv., [Hebard Cln.].

Kentucky: Cumberland Gap, VII, 1876, (G. Dimmock), 1♂, 1♀, 7 juv., [M. C. Z.].

² Arizona is also given, this taken, however, from material of *Spongovostox apicedentatus*.

Louisiana: Arcadia, VIII, 20, 1915, (Rehn & Hebard; in great numbers under bark of dead birch, many immature individuals not taken; *Prolabia pulchella* also present, but much less numerous), 23 ♂, 33 ♀, 39 juv., [Hebard Cln. and A. N. S. P.J.

This species is usually found under the bark of dead trees. We have found it only on magnolia and birch.

The insect has a very wide distribution over the southern and eastern portions of the United States, but is so rarely encountered that the records give little definite information as to the limits of its distribution. In Florida it has not been taken south of Enterprise. The most western records are Clifton and Columbia, Texas. The most northern are Dallas, Texas³; Arcadia, Louisiana; Cumberland Gap, Kentucky, and Philadelphia, Pennsylvania. The insect has once been found locally in very large numbers and has been reported common in Texas by Belfrage. Over the greater portion of its distribution in the United States it may, however, rightly be termed a rare species. The distribution in the Americas of this species and *Dornia lineare*, are the widest known for any non-domiciliary earwigs of the New World.

5. *Spongovostox apicedentatus* (Caudell).

1876. *Spongophora brunneipennis* Scudder, (in part, not *Psalidophora brunneipennis* Serville, 1839), Bull. U. S. Geol. Geogr. Surv. Terr., II, p. 252. [Arizona.]

1902. *Spongophora brunneipennis* Scudder and Cockerell, (not *Psalidophora brunneipennis* Serville, 1839), Proc. Davenport Acad. Sci., IX, p. 18. [La Cueva, Organ Mountains, New Mexico.]

1904. *Labia melancholica* Rehn, (not of Scudder, 1876), Proc. Acad. Nat. Sci. Phila., 1904, p. 562. [Florence, Arizona.]

1905. *Spongophora apicedentata* Caudell, Proc. U. S. Nat. Mus., XXVIII, p. 461, fig. 1a. [Columbia, Texas; Catalina Springs, Tucson (type locality) and Fort Yuma, Arizona; Los Angeles and San Diego Counties, California.]

1911. *S[pongovostox] apicedentatus* Burr, Deutsch. Ent. Nat.-Biblioth., II, p. 59. (Generic assignment.)

Arizona: Sabino Basin, Santa Catalina Mountains, 3800 feet, VII, 8 to 20, 1916, (Lutz & Rehn), 1 ♀, [A. M. N. H.]; Sabino Cañon,

³Bruner's southeastern Nebraska record of the species may be valid, but seems decidedly doubtful. No material from that region is to be found in the Bruner Collection.

Santa Catalina Mountains, III, 10 to V, 2, 1916, (J. F. Tucker; 36 from dead Sahuaro), 13♂, 31♀, 4 juv., [Hebard Cln.]; Tucson, VII, 3 to 5, 1916, (Lutz & Rehn), 1♀, [A. M. N. H.]; Santa Cruz Village, Comobabi Mountains, VIII, 10 to 12, 1916, (Lutz & Rehn; from dead and sour Sahuaro), 2 juv., [A. M. N. H. and A. N. S. P.].

This species is apparently the only indigenous earwig of the southwestern desert regions and is a difficult insect to locate. It has usually been found in dead Sahuaro or Giant Cactus, *Cereus giganteus*, but extends its range far beyond that of the plant. In addition to the records given above and those of the references, the species has only been recorded from Isabel, Texas.

6. *Labia minor* (Linnaeus).

1758. *Forficula minor* Linnaeus, Syst. Nat., (10), I, p. 423. [Europe.]
1838. *Labia minor* Doubleday, Ent. Mag., V, p. 279. [Wanborough, New York.]
1862. *Labia minuta* Scudder, Bost. Jour. Nat. Hist., VII, p. 415. [Massachusetts; Virginia.]

Ontario: Ottawa, IX, 8, 1912, (J. I. Beaulne), 4♂, 2♀, [A. N. S. P. and Hebard Cln.].

Maine: Norway, (S. J. Smith), 5♂, 1♀, [M. C. Z.].

Massachusetts: Beverley, VI, 1, 1866, (E. Burgess), 1♀, [M. C. Z.]; Medford, VI, 1907, 1♀, [M. C. Z.]; Cambridge, XI, 1, 1881, 1♂, 1♀, [M. C. Z.]; Wollaston, 1883, (F. H. Sprague), 1♂, [M. C. Z.]; Chicopee, X, 15, 1897, 2♂, 4♀, [A. N. S. P. and Hebard Cln.].

Rhode Island: Providence, V, 25, 1871, (outside stable), 6♂, 27♀, [M. C. Z.].

New York: Ithaca, VIII, 1 and 9, 1901 and 1904, [Cornell Univ. Cln.]; Albany, (Peck), 1♂, [M. C. Z.]; Tuxedo, V, 23, 1900, (T. D. O'Connor), 1♀, [Hebard Cln.].

New Jersey: Boonton, VII, 23, 1901, (G. M. Greene), 1♂, [A. N. S. P.].

Pennsylvania: Philadelphia, IV, 26, 1915, (J. A. G. Rehn), 1♂, [A. N. S. P.]; Frankfort, 1♀, [A. N. S. P.]; Chestnut Hill, VII, 1903, (M. Hebard; flying at dusk), 1♀, [Hebard Cln.]; St. Martins, VII, 5, 1916, (M. Hebard; flying before dusk), 1♀, [Hebard Cln.]; Olney, VII, 3, 1915, (M. Hebard; flying at dusk), 1♀, [Hebard Cln.]; Wyoming, VII, 21, 1903 and IX, 1904, (G. M. Greene), 1♂, 1♀, [A. N. S. P.] (these five localities in Phila.); Bryn Mawr, VI, 27, 1908, (M. Hebard; under board on manure pile), 2♂, 4♀, [Hebard Cln.];

Swarthmore, IX, 19, 1916, (E. T. Cresson, Jr.), 1♂, [A. N. S. P.].

Delaware: Delaware City, VII, 25, 1899, 1♂, [M. C. Z.].

Virginia: Hot Springs, VII, 29, 1916, (M. Hebard; flying before dusk), 1♂, [Hebard Cln.].

Wisconsin: Sparta, VIII, 7, 1896, (J. E. McDade), 1♂, 1♀, [M. C. Z.].

Manitoba: Aweme, IX, 11, 1909, (N. Criddle), 4♂, [Hebard Cln. and A. N. S. P.].

Nebraska: Lincoln, VIII and IX, 7♂, 8♀, [Hebard Cln. and A. N. S. P.].

California: Sonoma County, IV, 16, 1♀, [Hebard Cln.]; Claremont, (C. F. Baker), 2♂, [A. N. S. P.]

The species is frequently encountered in flight at, or just before, dusk. It is often numerous under debris about manure.

This minute insect, an adventive from Europe, has become widely distributed in the United States. It is the only earwig known from Canada, where it has been taken as far north as Quebec, Quebec. There are no records of its occurrence south of the Fall Line in the southeastern United States, except at Unadilla, Georgia,⁴ or from the Great Plains west to the Californian Sierras.

7. *Labia rehni* new species.

1914. *Labia minor* Rehn and Hebard, (not *Forficula minor* Linnaeus, 1758), Proc. Acad. Nat. Sci. Phila., 1914, p. 377. [Key West, Florida.]

Though very similar to *Labia minor* in general appearance, the unique female of this interesting species before us, is found to differ widely from females of that species, in the much smaller eyes, more ample pronotum, much shorter tegmina and wings, distinctive pygidium and forceps with ventro-internal margins not attingent, not perfectly straight and armed with microscopic, blunt serrulations.

Type: ♀; Key West, Florida. July 7, 1912. (Rehn & Hebard; under boards in store-house.) [Hebard Collection Type No. 439.]

Size very small; form moderately slender, very slightly more robust than in *L. minor*. Head, pronotum, tegmina, wings, abdomen and

⁴ The record by Rehn and Hebard from Key West, Florida, applies to *Labia rehni*.

forceps thickly clothed with short microscopic hairs. Head as in *minor*, but with eye only about three-fifths length of cheek⁵. Pronotum ample; lateral margins straight, parallel; caudal margin convex. Tegmina short, only a little longer than pronotum⁶; truncate caudad. Wings projecting beyond tegmina less than half the pronotal length⁷. Scent glands subobsolete. Untimate dorsal abdominal segment simple, as in *minor*; fully three times as wide as long, caudal margin transverse. Pygidium declivit; lateral margins feebly concave, subparallel; distal margin strongly concave, so that the latero-caudal portions of the pygidium project caudad as slender, acute, conical projections. Forceps moderately heavy, triquetrous in proximal portion; dorsal sur-

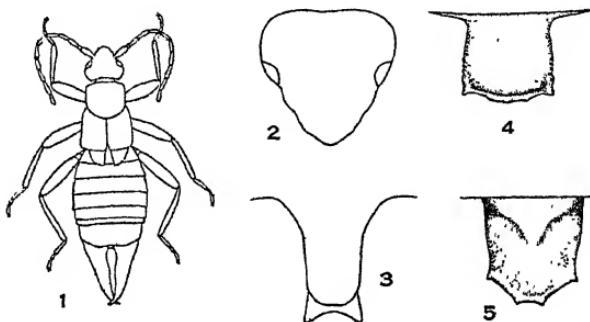


Fig. 1.—*Labia rehni* n. sp. Dorsal outline of type. (X 5.)

Fig. 2.—*Labia rehni* n. sp. Dorsal outline of head. Type, ♀. (Much enlarged.)

Fig. 3.—*Labia rehni* n. sp. Dorso-caudal outline of pygidium. Type, ♀. (Greatly enlarged.)

Fig. 4.—*Prolabia pulchella* (Serville). Dorso-caudal outline of male pygidium. Thomasville, Georgia. (Greatly enlarged.)

Fig. 5.—*Prolabia unidentata* (Beauvois). Dorso-caudal outline of male pygidium. San Francisco Mountains, San Domingo. (Greatly enlarged.)

face deplanate in proximal half, thence feebly convex; ventral surface deplanate; proximad the shaft is excavate to accommodate the pygidium, thence the internal face is deplanate for two-fifths the distance to apex, with ventral margin cingulate, feebly concave and microscopically closely and bluntly serrulate; beyond this point this margin is feebly lamellate from the juncture of the dorsal and ventral surfaces and is supplied with well-spaced, microscopic serrulations. Caudal margin of penultimate ventral abdominal segment transverse, very feebly convex. Limbs as in *minor*: short; thickly supplied with minute hairs; femora stout; metatarsus with ventral surface hairy, with two rows of chaetiform spines.

⁵ In *minor* the eye is only very slightly shorter than the cheek.

⁶ In *minor* nearly twice as long as pronotum.

⁷ In *minor* the wings project beyond the tegmina fully the pronotal length.

Length of body, .45; of pronotum, .86; of tegmen, 1.16; of exposed portion of wing, .41; of forceps, 1.36; width of pronotum, .88; of abdomen, 1.6 mm.

Head and pronotum bister. Tegmina and wings snuff brown. Dorsal surface of abdomen auburn, shading to blackish brown laterocephalad. Forceps auburn. Antennae, limbs and underparts buckthorn brown.

The type is unique.

8. *Labia curvicauda* (Motschulsky).

1863. *Forficelisa curvicauda* Motschulsky, Bull. Soc. Nat. Moscou, XXXVI, p. 2, pl. II, fig. 1. [Nura-Ellia Mountains, Ceylon.]

1912. *Labia curvicauda* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 237. [Long Key, Florida.] (First United States record.)

The species is known from the United States only from the large series taken at Long Key, Florida, in the dying tops of cocoanut palms, at the white bases of the petioles where these were moist.

9. *Prolabia pulchella* (Serville).

1839. *Forficula pulchella* Serville, Hist. Nat. Ins., Orth., p. 42. [Niagara, New York⁸.]

1876. *Labia guttata* Scudder, Proc. Bost. Soc. Nat. Hist., XVIII, p. 265. [Texas.]

1876. *Labia burgesii* Scudder, ibid., p. 266. [Palatka, Florida.]

1876. *Labia melancholica* Scudder, ibid., p. 267. [Waco, Texas.]

1900. *Labia pulchella* Bormans, Das Tierreich, p. 65. [Texas.]

1911. *Labia unidentata* Burr, (in part, not of Beauvois, 1917), Proc. U. S. Nat. Mus., XXXVIII, p. 451. [Florida; Thomasville, Georgia; Texas.]

1911. *Prolabia unidentata* Burr, (in part, not of Beauvois, 1917), Gen. Ins., Fasc. 122, Dermapt., p. 57. [United States.] (Generic assignment.)

Careful comparison of all the material before us of the Unidentata Group, proves conclusively the above synonymy, as has been indicated by Burr. Contrary to that author's opinion, however, the species found in the United States is distinct from the West Indian *Prolabia unidentata* (Beauvois).

In *pulchella*, the male pygidium is distinctive in being roughly subquadrate, with broad distal margin subtruncate.

⁸One specimen, collected by Schaum, bore no data: the other was labelled "Niagara"; clearly mislabelled or an adventive specimen.

Alabama: Greenville, VIII, 3, 1915, (M. Hebard; under bark of dead sweet gum), 1♀, [Hebard Cln.]; Evergreen, VIII, 3, 1915, (M. Hebard; under bark), 2♂, 4♀, [Hebard Cln.]

Louisiana: Nairn, XI, 1892, (H. E. Weed), 1♀⁹, [A. N. S. P.]; Arcadia, VIII, 20, 1915, (Rehn & Hebard; few under bark of dead birch, where *Vostox brunneipennis* was abundant), 2♂, 5♀¹⁰. [Hebard Cln. and A. N. S. P.].

This insect is common under the dead bark of trees in the southeastern United States, but particularly of dead pines of various species. Among deciduous trees it has been found under the bark of Sweet Gum, Oak, Magnolia and Birch. The winged condition has been much more frequently found under bark of deciduous trees, but this is not a rule.

The species is widely distributed over the southeastern United States, but has not as yet been secured on the Florida Keys. Its northern boundary on the Atlantic coast is the Fall line. The most northern records are Raleigh, North Carolina; Vienna, Georgia; Montgomery, Alabama, and Arcadia, Louisiana. The northwestern limits are Waco and Bosque County, Texas.

10. *Prolabia arachidis* Yersin.

1860. *Forficula arachidis* Yersin, Ann. Soc. Ent. France. (3), VIII, p. 509, pl. X, figs. 33 to 35. [[Adventive at] Marseilles, France.]

1900. *Labia burgessi* Henshaw, (not of Scudder, 1876), Psyche, IX, p. 119. [[Adventive at] Boston, Massachusetts.] (First United States adventive material.)

1911. *Labia arachidis* Burr, Proc. U. S. Nat. Mus., XXXVIII, p. 453. [From ship at San Francisco from India.]

1913. *Prolabia arachidis* Caudell, Proc. U. S. Nat. Mus., XLIV, p. 598. [Adventive at San Francisco, California, and Brighton, Massachusetts; Aiken, Florida.] (First United States established record.)

Texas: Brownsville, VI, (H. F. Wickham), 1♂, [Hebard Cln.].

The present domiciliary insect is known from the United States only from the above record and references, excepting the series taken by Rehn and Hebard, at Homestead, Florida.

⁹ This specimen is very pale in general coloration.

¹⁰ All these, and the Greenville specimen, have fully developed wings. In the series from Georgia and Florida, this condition is very rare; represented in but 6, of 271 specimens examined.

CHELIOSCHINAE.

11. *Chelisoches morio* (Fabricius).

1775. *F[orficula] morio* Fabricius, Syst. Ent., p. 270. [Tahiti.]

1907. *Chelisoches morio* Caudell, Jour. N. Y. Ent. Soc., XV, p. 169. [Menlo Park, California.] (First United States record.)

California: Alameda County, (R. Hunt; on bananas from Hawaii), 1♂, [Hebard Cln.].

Though the specimen here recorded is adventive, the species has become established at Menlo Park, California. It is widely distributed through the Papuan and Indo-Malaysian regions.

FORFICULIDAE.

FORFICULINAE.

12. *Doru lineare* (Eschscholtz).

1827. *Forficula linearis* Eschscholtz, Entomogr., p. 81. [Santa Catharina, Brazil.]

1865. *F[orficula] californica* Dohrn, Stett. Ent. Zeit., XXVI, p. 85. [California.] (First United States record.)

1876. *Forficula taeniata* Scudder, Bull. U. S. Geol. Geogr. Surv. Terr., II, p. 255. [Exotic localities; Arizona; Texas.]

1876. *Forficula exilis* Scudder, Proc. Bost. Soc. Nat. Hist., XVIII, p. 262. [Texas.]

1900. All these specific names referred to *Apterygida* by Bormans. Das Tierreich, II, pp. 110 and 111.

1911. *Doru exile* Burr, Gen. Ins., Fasc. 122, Dermapt., p. 79. [Exotic; southern United States.]

1911. *Doru lineare* Burr, (in part), ibid., p. 79. [Exotic; Southern United States.]

1914. *Doru lineare* Rehn and Hebard, Jour. N. Y. Ent. Soc., XXII, p. 90, figs. 1 to 4. (Synonymy; general diagnosis; records.)

Arizona: San Xavier, Pima County, VII, 24, 1916, (Lutz & Rehn; attracted to light). 1♂, [A. M. N. H.]; Palo Alto Rancho, Altar Valley, about 3000 feet, X, 10, 1910, (M. Hebard; moderate numbers in bunches of coarse green grass, in meadow near wash), 8♂, 3♀, [Hebard Cln. and A. N. S. P.]; Sycamore Cañon, Baboquivari Mountains, about 3700 feet, X, 6, 1910, (Rehn and Hebard; attracted to light), 1♀, [Hebard Cln. and A. N. S. P.].

The insect is usually found in rank grasses. It frequently appears at night at light.

In the United States, the species is known only from about Brownsville, Texas, generally over the Tucson region in

Arizona and from southern California. It is widely distributed southward over the American continent as far as the Misiones, Argentina. In the West Indies it is known only from Cuba.

13. *Doru aculeatum* (Scudder).

1862. *Forficula aculeata* Scudder, Proc. Bost. Soc. Nat. Hist., XVIII, p. 262. (In part.) [New York; northern Illinois; southern Michigan.¹¹]

1900. *Apterygida luteipennis* Bormans, (in part not *Forficula luteipennis* Serville, 1839), Das Tierreich, II, p. 118. [New York.]

1910. *Doru lineare* Burr, (in part not *Forficula linearis* Eschscholtz, 1827), Proc. U. S. Nat. Mus., XXXVIII, p. 464. (Name assignment without material at hand.)

1914. *Doru aculeatum* Rehn and Hebard, Jour. N. Y. Ent. Soc., XXII, p. 93, figs. 5 and 7. (General diagnosis, measurements, records.)

Alabama: Mobile, VIII, 27, 1915, (Rehn & Hebard; moderately common in cane, high weeds and cat-tails in swamp on edge of Mobile Bay), 2♂, 12♀, 8 juv., [Hebard Cln. and A. N. S. P.].

Louisiana: Harahan, Jefferson Parish, VIII, 7, 1915, (Rehn & Hebard; beaten from high grasses beside road), 1♀, [Hebard Cln.]; Morgan City, La., VIII, 8, 1915, (Rehn and Hebard; beaten from grasses and plants in swamp), 3♀, (wings fully developed) [Hebard Cln. and A. N. S. P.]

The specimens from Morgan City are the first of a macropterous condition to be found in the present species.

This insect is usually found in high grasses. It is difficult to locate.

The distribution of this species covers the Mississippi Valley, not extending west of the line of semi-aridity. It is known northwestward to eastern Nebraska, northward to southern Michigan, New York and Snake Hill, New Jersey. Though apparently common in the southern Appalachians, it apparently does not occur southeastward of that region. We believe the species will be found on the Gulf coast from western Florida to eastern Texas.

14. *Doru davisi* Rehn and Hebard.

1914. *Doru davisi* Rehn and Hebard, Jour. N. Y. Ent. Soc., XXII, p. 95, figs. 6 and 8. [South Bay, Lake Okeechobee, Florida.]

¹¹ The specimen recorded from Cuba, with a query, represents *Doru lineare*.

This striking species is still known only from the series originally studied, taken on the lake shore on low tangled vegetation between the water and a thick growth of Custard-apple trees.

15. *Forficula auricularia* Linnaeus.

1758. *F[orficula]auricularia* Linnaeus, Syst. Nat., Ed. X, I, p. 423 [Europe.]

1853. *Forficula auricularia* Fieber, Lotos, III, p. 254. [Exotic record; America.] (First American record.)

Rhode Island: Kingston, XII, 6, 1912, (A. E. Steene), 1♂, 1♀, [U. S. N. M.]; Newport, late VI, 1914, (R. W. Glaser), 5 juv., [A. N. S. P. and Hebard Cln.].

This insect has been previously reported from the United States from adventive material. It has recently become permanently established in New England, the species appearing in great numbers out of doors at Newport, Rhode Island.

In addition to the species considered above, a specimen of *Spandex percheron* (Guerin and Percheron), adventive in Massachusetts, was first described as *Spongophora bipunctata* by Scudder, then recorded as *Forficula percheroni* by Scudder and later as *Psalis percheroni* by Caudell.

Some North American Anthomyiidae (Dipt.).

By O. A. JOHANNSEN, Cornell University, Ithaca, New York.

Since the appearance of my paper on New Eastern Anthomyiidae* I have noted several novelties, among them the male of *Dialyta flavitibia* which was kindly sent to me by Mr. C. W. Johnson. The discovery of the male of this species confirms my generic determination. I have also found the male of the *Hylephila*,† mentioned in my previous paper, which enables me to give a description of the species.

Hammomyia paludis n. sp.

♂.—Length 5-6 mm. Head black, silvery gray pruinose with black reflections; in profile the genae are about 0.4, the buccae about 0.6, the

*Trans. Amer. Ent. Soc., XLII:385.

†*Hylephila* appears to be preoccupied in Lepidoptera. The genus may be merged with *Hammomyia* as has already been done by Stein.

width of one eye; about 8 setae on each side of the front; four or five incurved setae below vibrissae, setae on the lower part of the buccae long and fine, though sparse. Face concave in profile, oral margin distinct; antennae black, third segment nearly twice as long as the second, not reaching the oral margin by a distance of over half the length of this segment; arista noticeably thickened at the base, short pubescent to the tip. Frontal stripe dull black, at the narrowest point but little broader than the diameter of the anterior ocellus; orbits gray pruinose, each at the narrowest point over half as wide as the frontal stripe in the same section; proboscis and palpi fuscous.

Thorax black, brownish gray pruinose, with three black vittae, the laterals on line with the dorso-central setae. Inner d. c. (acrostichals) small, in two rows; d. c. $2+3$; st. $1+2$, long; "pra" fine, about a third as long as the following seta. Scutellum with a pair of strong basals, strong subapicals, small apicals, slender discals, besides some finer discal hairs; pubescence of the lower surface restricted to a few fine pale hairs.

Abdomen gray pruinose, each segment more fuscous at the base and with a median fuscous line narrowing at the posterior margin. The abdomen is more or less cylindrical, wedge-shaped posteriorly, each segment with long slender setulae both dorsally and ventrally, dorsal marginal setae distinctly stronger than the discal setulae; fifth sternite with a wide and deep triangular notch similar to that figured by Schnabl and Dziedzicki for *H. janowskii* (Pl. 26, fig. 691). The hypopygium closely resembles that of *H. unilineata* as figured by these authors on plate 5, figs. 79, 80.

Legs black, gray pruinose; femora with long fine setae, strongest on the lateral surfaces of the hind pair; fore tibiae each with two outer lateral extensor setae; middle tibiae each with five, one of which is on the basal third on the posterior extensor side, the others, nearly on a level beyond the middle, one anterior, one posterior, one outer, and one inner seta; hind tibiae each with two or more outer lateral flexor, four large outer extensor, three large posterior extensor, and five or more fine inner flexor, setae. Tarsal claws long, setulose at the base, about as long as the pulvilli.

Wings brownish gray hyaline, veins brown; costal spines small but distinct; veins R $4+5$ and M $1+2$ parallel or very slightly converging at the tip; extreme tip of R $4+5$ slightly reflexed; R₁ ends opposite the r-m crossvein; m-cu crossvein slightly sinuous, perpendicular to Cu₁; penultimate section of M $1+2$ is about two-thirds as long as the ultimate section. Squamae yellow-tinged, upper one covers the lower; halteres dark yellowish.

♀.—Like the male, except that the antennae are a little shorter; the lower posterior sterno-pleural seta is much shorter than the upper; "pra" about half as long as the following seta. Setulae of the abdomen

stout, but not as long as in the male. Apex of the ovipositor with the upcurved spines characteristic of the females of this genus. Hind tibiae lack the fine setae of the inner flexor surface. Last section of M $1+2$ only about a fifth or a fourth shorter than the penultimate. The size is quite variable, ranging from 4 to 7 mm. in length.

Type (male) from Melrose Highlands, Massachusetts, in my collection. Paratypes from Melrose Highlands, Massachusetts, and Ithaca, New York, Melrose Highlands Laboratory and Cornell University collections. April and May.

Some specimens in Dr. J. M. Aldrich's collection from Lafayette, Indiana, differ only in having a much larger "pra," in having numerous setulae among the acrostichals, and more abundant and larger setulae upon thorax and abdomen. This species differs from *H. maculata* St., in the chaetotaxy of the legs and in the structure of the hypopygium of the male; from *H. unilineata* it differs in having narrower genae, in the form of the fifth sternite and in size. *H. maculata* has not yet been taken in New York; my previous reference to it should be applied to *H. paludis*.

PROSALPIA.

This genus resembles *Hammomyia* and *Hylephila* in having an elongate anal vein, a pilose lower surface of the scutellum, and narrow front in both sexes, but differs from the former in having a bare or pubescent arista and from both in not having the head inflated. The two species recorded from North America in Aldrich's catalogue may be distinguished as follows.

- a. Thorax and abdomen shining black, without pruinosity. Female.
arelate Walker.
- aa. Thorax brownish gray with darker vittae; opaque.
silvestris Fall.

There is a female specimen in the Cornell University collection from Truro, Nova Scotia, of the second species which I cannot distinguish from my European specimen. Walker (List, IV) described three species from Canada, which Stein, with a slight doubt in each case, considers synonymous with *silvestris*. A study of the descriptions reveals but trifling differences.

LISPOCEPHALA.

The species of this anomalous genus were formerly grouped with *Coenosia* to which they bear a striking resemblance in the arrangement of the sterno-pleural setae, setæ of the posterior tibiae, wing venation, and in the spotted abdomen. The genus is now placed among the *Limnophorinae*. The front is broad in both sexes as in *Lispa*, and the fulcrum of the hypopygium of the male is directed forward. The species thus far known to occur in the United States may be separated as follows.

- a. Crossvein not clouded.
- b. Middle tibia with a bristle on the anterior side; costal spine present; wing with a brownish tinge. Ohio, New Hampshire,
verna Fabr.
- bb. Middle tibia with no seta on the anterior side; costal spine not distinct.
 - c. Wing of the male milky white. Many localities in the United States....*erythrocerata* R. D. (= *lacteipennis* Zett. IV, 1722).
 - cc. Wing of the male grayish hyaline. Massachusetts,
var. of *erythrocerata*?
- aa. Crossveins clouded; middle tibia with no seta on the anterior side. Orono, Maine.....*alma* Meigen, var. *pallipalpis* Zett. (b).

There is another *lacteipennis* Zett. (IV. 1586), a species not yet recorded from the United States, which should not be confused with *L. erythrocerata* (= *lacteipennis* Zett., IV. 1722). The former species is now placed in *Dexiopsis*, a Coenosine genus. Specimens of *L. alma* were taken at Orono, Maine, in October. I have referred these specimens to var. *pallipalpis* Zeit. (b) because the abdomen is but faintly translucent at the base and at the apical margins of the first and second segments.

Limnophora torreyae Joh.

In the original description of this species a misprint occurs. The post sutural d.c. setae are four and not three in number. In some specimens the orbits are not quite contiguous, being separated by a slender frontal line.

Mydaea pectinata Joh.

In the original description of this species, fourth line from the top, page 393, substitute for the words "tibia with a row" the words "tibia with an irregular double row."

Phaonia nigricans Joh.

The genus *Phaonia*, as at present defined by recent European workers, is distinguished from *Mydaea* by the presence of a seta on the posterior median extensor surface. If this interpretation be adopted the specific name noted above which I assigned to one of our New York species need cause no confusion. If, however, the emphasis be placed upon the presence or absence of the pilosity of the eyes, redistributing the species into the two groups corresponding to the genera *Hyetodesia* and *Spilogaster*, then the name *nigricans* becomes a homonym, having been assigned to another species by Stein in 1897. For the benefit of those who prefer the latter grouping of species I suggest that the name *cayugae* be adopted to replace my *nigricans*.

An additional locality record for this species is McLean, Tompkins County, New York.

Dialyta flavitibia Joh.

♂.—Like the female except that it is a trifle smaller (6 mm.); the front is about as wide as one eye, somewhat narrowing at the base of the antennae; buccae narrower and antennae longer and broader than in the female; orbits about half as wide as the frontal stripe at the lower ocellus. Abdominal setae longer and stouter than in the female; five pairs of marginal setae on each of segments two and three and six pairs on the fourth, five pairs of discals on the third and fourth segments; all sternites visible. Femoral setae stronger and more numerous; tibial setae as in the female except that those of the hind legs on the outer lateral flexor side are more uniform in size. Crossveins only faintly tinged; one large costal spine; R $4+5$ more arched upward. The hypopygium somewhat resembles that of *D. atriceps* as figured by Schnabl and Dziedzicki (Pl. 21, figs. 555, 556). In our species, however, the fulcrum has, in addition to the laterals, a small median tubercle on the ventral side; the inferior forceps are stouter, and the superior forceps are quite different, being deeply cleft, resembling those shown in fig. 493 (Pl. 19), but with the median angles rounded, not produced. The fifth sternite differs but little from that figured for *D. atriceps*.

This specimen was taken at Danbury, Connecticut, in June, and sent to me by Mr. C. W. Johnson: There is a female specimen in the Cornell Collection from Ohio, and Mr. Johnson writes me that the species also occurs in Pennsylvania and Ontario.

New Species of Lepidoptera.

By HENRY SKINNER.

Argynnис californica n. sp.

♂. This species is paler in color than its related forms and has a faded or washed out appearance in comparison with its relatives. In size it is smaller than *snyderi* which it resembles in markings. It is about the same size as *calippe* Bd. and *juba* Bd. but is larger than *coronis* Behr. It can be at once separated from *calippe* by its much lighter color and from *juba* by the much duller color of the buff band on the underside of the secondaries. Both sexes are heavily silvered beneath.

♀. Quite similar to the male in color and markings.

The male expands 56 mm. and the female 58 mm.

Described from fifteen specimens from California, the type and paratypes were taken by Mr. J. G. Grundel at Alma, Santa Clara County.

I would not have ventured describing this species without a good figure if it had not been already well figured by Mr. W. H. Edwards under the name *coronis*, in his *Butterflies of North America*, vol. 3, pl. 4 of *Argynnis*. A number of years ago I compared specimens of my own with the type of *coronis* Behr in the Strecker collection. Due to Mr. Edwards' figure of this species it has been accepted as *coronis* and *snyderi*, a related species, has been considered by some persons a variety of *coronis*. The true *coronis* is very close to *juba* and *calippe*.

Melitaea arida n. sp.

Upperside. Primaries dull fulvous marked with a series of small spots crossing the wing from the costa to the interior margin. The submarginal row is almost obsolete, the central spot being a crescent; the next row consists of three larger spots beyond the cell and two below, the last one small and hour-glass in shape; the last row consists of one spot near the end of the discal cell and one spot directly below it.

Secondaries same color as primaries with three rows of spots crossing the wing from the costa to the interior margin. The submarginal row consists of seven, narrow, minute yellowish crescents; the next row is composed of six minute black spots edged on the inner side by dull yellow; the next row is a curved line of minute yellowish spots; there is a yellow linear spot in the cell.

Underside. The primaries have a marginal border composed of brown and yellowish spots; the limbal area is marked by spots of two shades of fulvous.

The secondaries have a submarginal row of crescents, two near the costa and one at the lower third; the next row consists of five small black dots, the lower one very minute; the basal area is made up of several rows of spots semi-silvered.

Expanse 26-30 mm.

Type and paratype. Two specimens marked Cochise Co.,

Arizona, May. Received from Mr. F. Haimbach without more definite locality.

This species is close to *vesta* Edw. but the markings are much fainter and different in color, those of *vesta* being orange-fulvous. The characteristic row of orange fulvous spots so conspicuous in *vesta* is replaced in *arida* by a faint line of spots. The silvered spots on the underside of the secondaries are also characteristic.

Erythroecia hebardi n. sp.

In volume nine of Sir George Hampson's Catalogue of the Lepidoptera Phalaenae, p. 57, there is erected the new genus *Erythroecia* with the type species *suavis* H. Edwards. He describes a new species under the name *rhodophora* which is figured on plate 138, no. 4. The type locality given is Capitulo, Guatemala.

Last summer Mr. Morgan Hebard captured a species of *Erythroecia* at Hot Springs, Virginia, August 15th, at light, two perfect male specimens.

This appears to be a much more robust species than *rhodophora* and the primaries are much more obscured by red (crimson) and the ground color of the wings is yellow, almost orange. The orbicular and reniform do not show as in Hampson's figure. The Virginia species expands 34 mm.

It is possible that this may be a very good species, a topomorph or only a variety of *rhodophora* but additional material is needed to establish their true relationship. If they are the same species the distribution as at present known appears very strange.

Autographa olivacea n. sp.

♂. Head and thorax gray mixed with white hairs; tegulae gray; thoracic crest gray-white at tips; abdomen and legs gray; crests brown tipped with gray. Fore wing grey tinged with whitish olive, the medial area below the cell shining dark olive, extending from the apex and covering the outer third of the wing and extending two-thirds the distance to the inner margin; orbicular faintly indicated and not silvered; a very small silver stigma, linear and having a faint incurved point at the outer end; hind wing with a greenish tinge.
Expanse 39 mm.

Type one specimen sent to me by Mr. Eugene O. Murrmann, taken at Los Angeles, California, August, 1916.

This species resembles *ampla* Walk. but may be readily differentiated by the olive shade of the outer half of the primary wing.

The types of these species are in the collection of The Academy of Natural Sciences of Philadelphia.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., JULY, 1917.

Insects and War.

Unfortunately the lessons of the past have not been sufficiently taken to heart and at the present time we are confronted with the grim destroyer in many forms. Every soldier thinks he will be one of the fortunate individuals and escape some death-dealing missile, but he is much more likely to be the victim of some low and minute form of either animal or vegetable organism.

In spite of the great advance of modern science and knowledge gained, its practical application is relatively very defective and inefficient. The mind of the medical profession runs largely to therapeutics—the application of drugs to the cure of disease, but unfortunately remedial measures can't compare in value with preventive medicine. The sick soldier is a distinct loss as a fighting unit and is a menace and expense to the Government as he needs hospitals, doctors, nurses and medicines.

A few references to the past may enlighten the thoughtful. During the Civil War, on the Union side, 93,369 soldiers were killed and 186,216 died from disease. In the Crimean War 4,602 were killed and 17,580 died victims of disease. A remarkable example of mortality from disease and low death rate from wounds is shown by the figures from the French Expedition to Madagascar in 1894, 29 being killed and 7,000 dying from disease. In the Spanish-American War only 454 Americans were killed and 5,277 died from disease, mostly typhoid fever carried by house-flies. A more specific instance of disease morbidity and mortality is shown by what happened to the First Pennsylvania Infantry in 1898. There were 792 men in the regiment and 169 cases of typhoid fever and twelve deaths. In many of the camps in this country and Cuba men were compelled to walk through human excrement to get to the latrines, and the food in the mess tents was black with flies. The mouths of the sick soldiers in the hospitals and hospital

tents could not be seen for house-flies, and these insects were sucking the juices from the lips of unconscious soldiers and many of these sick men were brought to Philadelphia by the car-load.

Insects are responsible entirely or in large part for the transmission of typhoid fever, typhus fever, malaria, yellow fever and tuberculosis and many lesser forms of disease.

Strange to say, the persons most keenly alive to these conditions and the persons who are meeting and trying to prevent these things are the mothers of the young men being trained for war.

So far as we are aware the Government has done very little to prevent a recurrence of this dreadful sacrifice of life. There will be plenty of medical men to look after the small ills incident to camp life, but will the expert and capable men be there to guard against disease? It has been suggested that a medical entomologist should be stationed at each concentration camp, a most important matter, as sanitation and preventive measures greatly exceed drug therapeutics in importance. We sincerely hope that the present war will not show the dreadful mortality from disease exhibited in the wars of the past.—

HENRY SKINNER.

The second report of the Emergency Entomological Service of the United States Department of Agriculture, to which we called attention in the News for June, page 283, has appeared, dated June 1, 1917, in 19 mimeographed pages. It announces the establishment, as an emergency measure, of a distinct section or branch of the Bureau of Entomology, that of "Stored Product Insect Investigations," of which Dr. E. A. Back has been put in charge. Plans for the use of the Boy Scout organization to report insect injuries and to spray infested small gardens are being developed. There are reports of insect injuries as in the first report; 3½ pages are devoted to a consideration of the "acute situation [which] appears to exist as to the supply of arsenical insecticides in this country." It is stated that "The Council of National Defense is still considering the plans for the utilization of entomologists in the war. The present plan of the Council provides for a corps of entomologists to be coordinate with the corps of sanitarians. This subject is also being considered by the Chief of Bureau and the Surgeon General of the Army Medical Corps."

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded.

The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new species are all grouped at the end of each Order of which they treat. Unless mentioned in the title, the number of the new species occurring north of Mexico is given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

- 3—The American Naturalist. 4—The Canadian Entomologist.
- 5—Psyche. 11—Annals and Magazine of Natural History, London.
- 37—Le Naturaliste Canadien, Quebec. 50—Proceedings, U. S. National Museum. 102—Proceedings, Entomological Society of Washington. 141—Proceedings, Indiana Academy of Sciences, Indianapolis. 143—Ohio Journal of Science, Columbus, Ohio. 153—Bulletin, American Museum of Natural History, New York. 161—Proceedings, Biological Society of Washington. 184—Journal of Experimental Zoology, Philadelphia. 195—Bulletin, Museum of Comparative Zoology, Cambridge. 198—Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. 238—Annales, Sociedad Cientifica Argentina, Buenos Aires. 263—Proceedings of the Hawaiian Entomological Society, Honolulu. 335—Smithsonian Miscellaneous Collections. 373—Contributions to the Natural History of the Lepidoptera of North America, by Wm. Barnes and J. H. McDunnough, Decatur, Ill. 392—The Irish Naturalist, Dublin. 411—Bulletin, The Brooklyn Entomological Society. 420—Insecutor Inscitiae Menstruus: A monthly journal of entomology, Washington. 537—Proceedings, Entomological Society of Nova Scotia, Truro. 538—Lorquinia, Los Angeles. 540—The Lepidopterist, Official Bulletin, Boston Entomological Club. 547—Journal, The Franklin Institute, Philadelphia.

GENERAL SUBJECT. Banks, N.—Index to the literature of American economic entomology, Jan. 1, 1905, to Dec. 31, 1914 (323 pp.). [Pub. Am. Assoc. Ec. Ent., Melrose Highlands, Mass.]. Berlese, A.—Gli insetti loro organizzazione, sviluppo, abitudini e rapporti coll'uomo (II, fasc. 13-16). Bethune, C. J. S.—The insect collections of Canada. I. The collections of the entomological society of Ontario, 4, 1917, 153-7. Cockerell, T. D. A.—Sunflower insects in Virginia and Connecticut, 4, 1917, 212. Descriptions of fossil insects [2 new], 161, xxx, 79-82. Dahlgren, U.—The pro-

duction of light by animals. III. Worms, crustaceans and lower insects (99 pp. reprint), 547, May-Jan., 1916-17. DeWolfe, L. A.—How to collect and preserve insects, 537, 1916, 12-15. Howard, Schwarz & Busck—A biographical and bibliographical sketch of Otto Heidemann, 102, xviii, 203-5. McIndoo, N. E.—Recognition among insects, 335, lxviii, No. 2, 78 pp. Pierce, W. D.—Notes on a southern trip, 102, xviii, 206-7. Provancher—Biographical note by C. V. A. Huard, 37, xlili, 145-52. Slosson, A. T.—Experiences of a collector, 411, xii, 25-9.

PHYSIOLOGY AND EMBRYOLOGY. Foot & Strobell—Results of crossing *Euschistus variolaris* and *E. ictericus* with reference to the inheritance of two exclusively male characters, 198, xxxii, 322-42. Hyde, R. R.—On the change that takes place in the chromosomes in mutating stocks, 141, 1915, 339-44. Jennings, H. S.—Modifying factors and multiple alleomorphs in relation to the results of selection, 3, li, 301-6. Macdowell, E. C.—Bristle inheritance in *Drosophila*, 184, xxiii, 109-146. Painter, T. S.—A wing mutation in *Piophila casei*, 3, li, 306-8. Patterson, J. T.—Studies on the biology of *Paracopidosomopsis*, 198, xxxii, 291-305.

NEUROPTERA, ETC. Hood, J. D.—An annotated list of the Thysanoptera of Plummer's Island, Md., 420, v, 53-65. Howe, R. H.—Distributional notes on New England Odonata, 5, xxiv, 45-53. Walker, E. M.—Seasonal irregularities in the occurrence of dragonflies, 4, 1917, 171-8.

Kennedy, C. H.—Notes on the life history and ecology of the dragonflies of central California and Nevada [several n. gen. and sps.], 50, iii, 483-635.

ORTHOPTERA. Caudell, A. N.—Color dimorphism in *Schistocerca damnifica*; The habitat of *Doru aculeatum*, 102, xviii, 216-17. Crampton, G. C.—A comparison of the antennae of the Grylloblattidae and Embiidae to demonstrate the relationship of these two groups of insects, 4, 1917, 213-17. Gooderham, C. B.—The Acrididae of Nova Scotia, 537, 1916, 21-30. Illingworth, J. F.—Regeneration in cockroaches, 263, iii, 266.

HEMIPTERA. Drake, C. J.—New and noteworthy Tingidae from the United States [3 new], 143, xvii, 213-16. Gibson, E. H.—Three n. sps. of Jassoidea from Missouri; Two n. sps. of Dicyphus from Porto Rico, 4, 1917, 183-4; 218-19. Gillette, C. P.—Two new aphid genera and some new species, 4, 1917, 193-98. Heidemann, O.—Two n. sps. of lace-bugs, 102, xviii, 217-9.

LEPIDOPTERA. Brethes, J.—Estudio fito-zoologico sobre algunos lepidopteros argentinos productores de agallas, 238, lxxxii, 113-40. Dyar, H. G.—Seven new Pyralids from British Guiana,

420, v, 88-92. **Forbes, W. T. M.**—Notes on West Indian Syntomidae and Arctiidae, 153, xxxvii, 339-45. **Hampton, G. F.**—Descriptions of new Pyralidae of the subfamilies Hydrocampinae, Scopariinae, etc., 11, xix, 361-76 (cont.). **Marchand, W.**—The specific differences between *Apantesis nais*, *A. vittata* and *A. phalerata*, 5, xxiv, 59-60. **May, R. M.**—The life history of a swallowtail butterfly (*Papilio zolicaon*), 538, i, 77-9.

Barnes & McDunnough—A revision of the genus *Hydriomena* [8 new], 373, iv, 1-59. **Dyar, H. G.**—Miscellaneous new American L. [8 new]; Notes on No. Am. Pyraustinae [6 new]; Notes on No. Am. Nymphulinae [7 new]; Notes on No. Am. Schoenobiinae [10 new]; Seven new Crambids from the United States, 420, v, 65-87. **Pearsall, R. F.**—*Synchlora avidaria* n. sp., 411, xii, 34-5. **Swett, L. W.**—New Geometrids [2 new], 540, i, 45-8.

DIPTERA. **Elwyn, A.**—Effect of humidity on pupal duration and on pupal mortality of *Drosophila ampelophila*, 153, xxxvii, 347-53. **Gibson, A.**—The occurrence of *Eumerus strigatus* in Canada, 4, 1917, 190-1. **Ludlow, C. S.**—*Cycloleppteron* [new localities for], 5, xxiv, 53. **Snyder, T. E.**—Notes on horseflies as a pest in southern Florida, 102, xviii, 208-10.

Alexander, C. P.—New nearctic crane flies, III. [11 new], 4, 1917, 199-211. **Hine, J. S.**—Descriptions of North American Tabanidae [5 new], 143, xvii, 269-71. **Malloch, J. R.**—A key to the No. American genera of Coenosiainae [1 new g., 1 n. sp.]; A new gen. and sp. of Anthomyiidae, 411, xii, 35-7; 37-8. **Parker, R. R.**—A new *Sarcophaga* from New York, 4, 1917, 157-61. **Smith, H. E.**—Notes on New England Tachinidae, with the description of one n. gen. and two n. sps., 5, xxiv, 54-8. **Van Duzee, M. C.**—Descriptions of a few new *Diaphorus* from the western states [7 new], 5, xxiv, 33.

COLEOPTERA. **Chapin, E. A.**—Miscellaneous notes on C., 411, xii, 29-31. **Schaeffer, C.**—Notes on a few Eucnemidae and descriptions of new Elateridae [5 new], 411, xii, 39-44. **Schwarz, E. A.**—*Rhizobius* not *Rhyzobius*, 102, xviii, 214.

Fall, H. C.—New Coleoptera.—VI. [9 new]. 4, 1917, 163-71. **Fisher, W. S.**—A new sp. of *Xylotrechus*, 102, xviii, 214-16.

HYMENOPTERA. **Chapais, J. C.**—Quelques notes sur le "ver limace du poirier," 37, xlili, 153-6. **Scharff, R. F.**—Should wasps be killed? 392, 1917, 88. **Schwarz, E. A.**—Ants protecting acacia trees in Central America, 102, xviii, 211-12. **Stohr, L. M.**—An interesting case of instinct, 4, 1917, 161-3. **Turner, R. E.**—Notes on fossorial H. On new species in the British Museum, 11, xix, 317-26.

Banks, N.—New fossorial H. [28 new], 195, lxi, 97-115. **Felt, E. P.**—Two new sawflies, 4, 1917, 191-2. **Gahan, A. B.**—Descriptions of some new parasitic H. [2 n. g.; 26 n. sps.], 50, liii, 195-217. **Girault, A. A.**—The North American species of *Habrocytus* [6 new], 4, 1917, 178-82. **Myers, P. R.**—An American species of the hymenopterous genus *Wesmaelia*, 50, liii, 293-94. **Rohwer, S. A.**—A report on a collection of H. (mostly from California) made by W. M. Giffard [15 new], 50, liii, 233-49. A nearctic species of *Dolichurus*; *Diprion simile* in No. America, 102, xviii, 212-14.

OBITUARY NOTES.

[We have brought together, from various sources, published during the last year, the following data on entomologists who have recently passed away.]

A brief note in *Science* for February 2, 1911 (page 112) announced the death of JUAN J. RODRIGUEZ, of Guatemala City, on December 22, 1916. Thanks to Mr. William Schaus, we have received a typewritten copy of an obituary notice in *El Diario de Centro-América* (Guatemala), for December 22, 1916, from which we translate the following:

Don Juan J. Rodriguez Luna, who was born in 1840 and who consequently died at the advanced age of 76 years, had shown already in his early youth his love for this class of studies [zoology] and his competence in dealing with them. As was the custom in that period, he began his education in the College of the Seminary and has left us interesting notes of the awakening of his scientific inclinations. In the Seminary there existed no provision for the natural sciences, but he already observed with attention the life of insects, their metamorphoses and habits, and toward the end of his stay in the college, Father Parias, to stimulate his inclinations, lent him a very elementary book from the library. Another Father, notwithstanding, counselled him not to devote much time to this occupation because "he who looks much at the earth does not look to heaven." This did not hinder the young lover of nature from continuing his studies, which must have been well advanced in 1864, when the Sociedad Económica de Amigos de Guatemala, founding the National Museum in that year, confided to him the zoological section.

In 1867 he was admitted as an advocate, a profession which he never practiced, and his father, don José Mariano Rodriguez, arranged that he should undertake a voyage to Europe. So the son made his first visit to the Old World in 1868. In Paris and especially in Belgium he cultivated the friendship of men of science working in zoology and chiefly in entomology and, with a great fund of new information, returned to Guatemala in 1869. The museum of the Economic

Society gained much by this voyage and in 1874 already possessed 786 specimens of birds alone, of 455 different species, all from Guatemala, exactly classified by Señor Rodriguez.

In 1878 and 1887 Señor Rodriguez Luna made two more voyages to Europe and in both obtained many things useful for his country and for the sciences of his specialty.

One of the benefits which Guatemala owes to him is the introduction of species new to the country. He introduced tubers and seeds of plants which today are abundant in our gardens; in 1865 he propagated *Eucalyptus globulus*, the first seeds of which were sent him by the distinguished Belgian naturalist, Dr. Candèze; in 1878 he sent home from Belgium various plants of Liberian coffee, subsequently acclimated, and propagated here the two existing species of *Bougainvillea* and various fruits and flowers. A distinguished agriculturist, he cultivated sugar-cane and coffee, improving both by careful and intelligent selection. He exported quinine on a large scale and many other native products. For this reason, at the International Exposition at Paris in 1900, he obtained the greatest number of prizes awarded to any single agriculturist and received the cross of Chevalier of the Legion of Honor.

A great quantity and variety of scientific, historical and literary work flowed from his pen, which were published in the periodicals and reviews of Central America and of Europe during fifty years, so that he became a member of the Zoological and Acclimatization Societies of France, the Entomological and Malacological Societies of Belgium, the Society of Sciences of Liège, the Aragonese Society of Natural Sciences, etc.

He was Minister of Fomento [Promotion of Industry, etc.] and an important member of the commissions of all of our national expositions.

It is due to his country, and at the same time to honor its distinguished son, to preserve and employ usefully the results of his long and laborious life. To no one more than to the Nation belongs the right of acquiring the zoological mus-

eum and library of the learned naturalist, the best of its kind which exists in Guatemala.

An obituary notice of Señor Rodriguez is also to be found in *The Entomologist's Monthly Magazine* (London) for March, 1917, written by Mr. G. C. Champion, who contributes some additional items based on personal acquaintance. The indebtedness of the *Biologia Centrali-Americana* to Rodriguez for Coleoptera and incidentally other insects is acknowledged in the Introductory Volume of that work (page 44). De Selys received from him the types of *Anisagrion allopterum* (Odonata) and Candèze many Elateridae.

The Entomologist's Monthly Magazine for March, 1917, contains also obituary notices of CHARLES OWEN WATERHOUSE, born at Bloomsbury, London, June 19, 1843, died at Acton, February 4, 1917, and of J. PLATT BARRETT, born near Marsden, Huddersfield, England, June 29, 1838, died December 27, 1916.

Waterhouse's father, G. R. Waterhouse, once keeper of Geology in the British Museum, and his brothers, E. A. and F. Waterhouse, all had entomological interests. C. O. Waterhouse was an Assistant and Keeper in the Entomological Department of the British Museum from 1866 to 1910, and was chiefly interested in the Coleoptera and Hymenoptera, his main work being on the Buprestidae in the *Biologia Centrali-Americana*. His *Aid to the Identification of Insects*, two volumes of colored plates, is well known. He was President of the Entomological Society of London, 1907-08.

J. P. Barrett was for fifty-three years an instructor in institutions for the deaf and dumb. His interests were mainly in the Macrolepidoptera of Britain and of Sicily and he was one of the founders of the South London Entomological and Natural History Society.

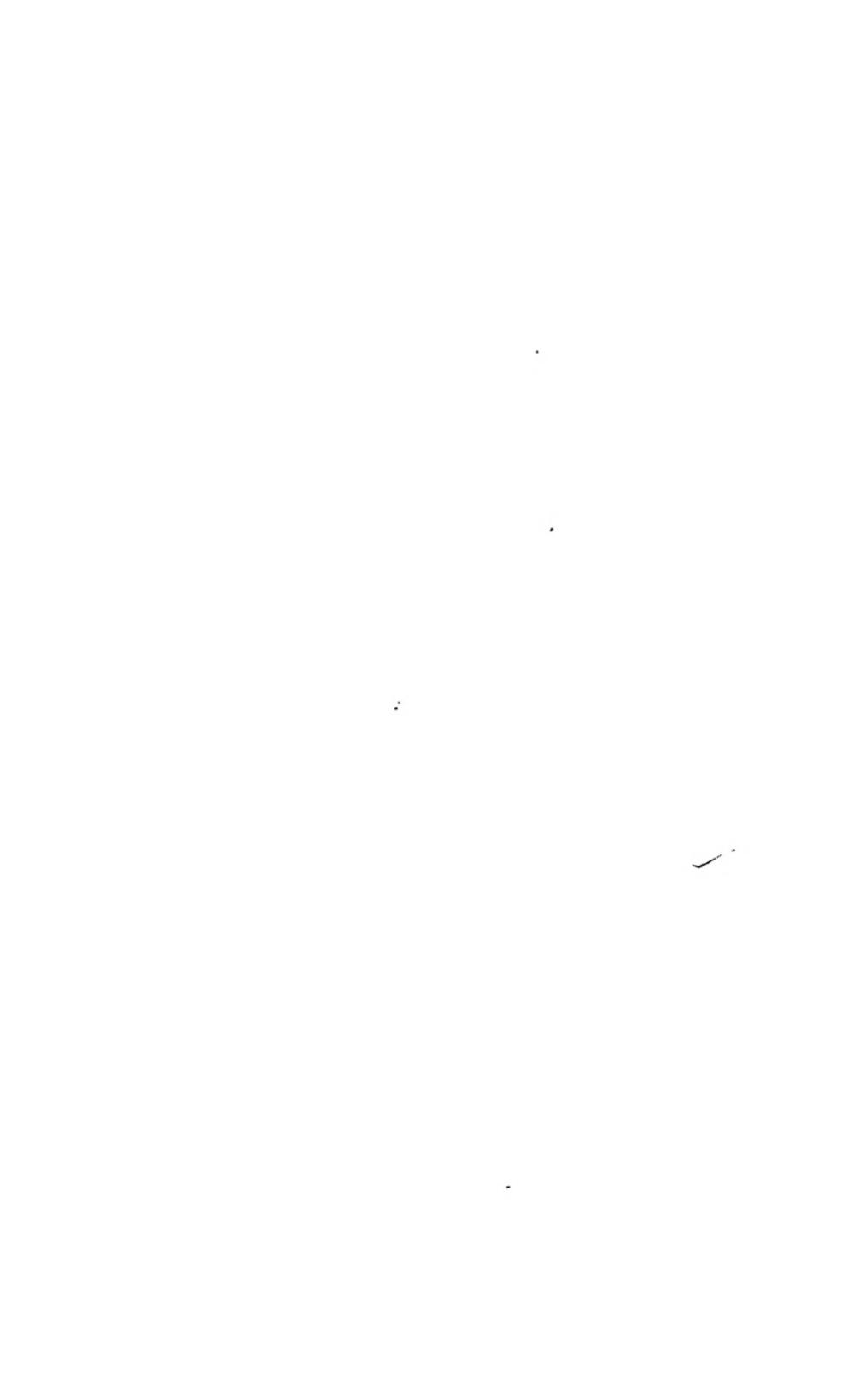
CHARLES ADOLPHUS BRIGGS, known for his work on British Lepidoptera, Neuroptera (sensu Linnaei) and Orthoptera, born May 26, 1849, died October 17, 1916. (Entom., January, 1917).

ARTHUR E. GIBBS, who had in recent years "made a considerable collection of American Rhopalocera and for some time past mainly occupied himself with the study of these insects," died March 3, 1917, aged 58. He was a proprietor of the *Herts Advertiser* and the *St. Albans Times* (England). (Ent. Mo. Mag., April, 1917).

Dr. E. Bergroth contributes a brief note on DR. BERTIL ROBERT POPPIUS, the Finnish entomologist, who died at Copenhagen, November 27, 1916, aged 40 years. His most important works are *Monograph of the holarctic subgenus Cryobius (Carabidae)* and *Monograph of the Ethiopian Cap-sidae* (2 vols., 1912-1914). (Ent. Mo. Mag., Jan., 1917).

ROLAND TRIMEN, the distinguished author of *South African Butterflies*, died as long ago as July 25, 1916, and his decease should have received mention in an earlier number of the News. He was born at Paddington, London, October 29, 1840. He spent the years 1860-1895 in South Africa, first in the civil service, then from 1873 as curator of the South African Museum at Cape Town. His most important scientific work was *On some remarkable Mimetic Analogies among African Butterflies* (Trans. Linn. Soc. Lond. xxvi, 1869), dealing with the females of *Papilio merope (dardanus)*. He was President of the Entomological Society of London in 1897 and 1898, his addresses on Mimicry and on Seasonal Variation "being of special interest and value. In 1883 he was elected a Fellow of the Royal Society and received in 1910 the high distinction of the Darwin medal." (Ent. Mo. Mag., Sept., 1916, Entom., Oct., 1916).

ORSON BENNETT JOHNSON, professor emeritus of Zoology in the University of Washington, died March 9, 1917, aged 69, according to a note in *Science* for April 13 last. We have previously mentioned (this volume, page 41) his gift of his entomological collection to his University. A quarter of a century ago we received Odonata from Seattle from him and others also are indebted to him for material.





SWARMS OF THE MONARCH BUTTERFLY—BERNHEIM.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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OCTOBER, 1917.

No. 8.

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Swarms of Butterflies (Lep.).

By JAMES L. BERNHEIM, Corporal, Band, Third U. S. Infantry.

(Plate XXIV.)

On September 4, 1916, and for several days following, near Eagle Pass, Texas, the air was fairly alive with swarms of *Libythea bachmani* (Snout butterfly), which were flying toward the north. They occupied a strip about a mile wide eastward from the Rio Grande, in which region the vegetation is most abundant.

They extended upward as far as the eye could reach, and, borne by a mild breeze from the south, were moving quite swiftly. During this time I made several collecting trips south of Eagle Pass and at each step stirred up veritable clouds of this interesting butterfly which immediately rose in the air and started north. There were literally millions of them and many

of them had evidently completed their allotted span of life as they were dropping from the air in large numbers.

One particular specimen flew past, almost brushing my face, and, as I thought, alighted upon the ground. As I stooped to examine it the wings suddenly folded down tightly in front of the body and I picked the insect up quite dead.

Late in October, while collecting east of Eagle Pass, I came upon a small pond upon the banks of which grew several quite large mesquite trees. These trees were almost covered by swarms of Monarchs (*Anosia plexippus*). They remained until the following day, when nearly all of them left within an hour or so.

Two days later the willows growing upon the bank of the Rio Grande were the resting place for a still larger swarm, some of which remained several days. I enclose a picture showing one of the trees

Descriptions of new Genera and Species of the Dipterous Family Ephydriidae—IV.

By E. T. CRESSON, JR., Academy of Natural Sciences of Philadelphia.

CEROPSILOPA n. gen.

A fairly well marked genus closely allied to *Psilopa* but evidently distinct; apparently belonging to a group containing the oriental *Rhynchosilopa* Hendel. The sub-pendent nature of the antennae, with the second and third joints apparently suspended from the exserted first, is very characteristic, as is also the hair-like apical spine of the second joint. *Psilopa longicornis* Meijere and several undescribed species from the Orient also belong here or to allied genera.

Description.—Head broad and high. Eyes bare. Frons broad with ocellar tubercle situated at the sharp vertex; ocellar bristles situated between the post-ocelli; the proclinate orbitals and generally the reclinate frontals present. Face narrowed at middle, convex to nearly carinate, not excavated at antennae; epistoma retreating. Antennae decumbent; second joint without apical production, but with or without the hair-like

spine; third long and slender; arista with long hairs above. Mouth small; clypeus exserted. Cheeks with distinct bristle. Mesonotum strongly convex; setulae distinctly seriated. Scutellum normal. Wings with costa attaining fourth vein.

Genotype.—*Ceropsilopa nasuta* n. sp.

***Ceropsilopa nasuta* n. sp.**

Black; second antennal joint, apical half of fore femora, entire fore and middle tibiae, apical three-fourths of hind tibiae and all tarsi, tawny. Halteres white. Wings and veins yellow. Shining to polished, with violet reflections on face and abdomen. No sculpturing on face. Face strongly keeled on lower part, in profile most prominent at middle. Antennae as long as face, first joint nearly as long as second, second with very short spine, third four times as long as second with very long arista. *Length*.—3.75 mm.

Type.—♀ ; Port of Spain, Trinidad (Ujhelyi). [Hungarian Nat. Museum.] *Paratype*.—I ♀ ; topotypical.

***Hydrellia tibialis* n. sp.**

Black; halteres white. Wings hyaline. Shining; frons opaque; face and lunule white; mesonotum subopaque with brownish dust; pleura and pectus opaque. Mesonotum with one pair of dorso-centrals situated near suture. Middle tibiae of male enlarged and thickened, as broad as femora. *Length*.—1.9 mm.

Type.—♂ ; Moscow, Idaho, October 9, 1907 (J. M. Aldrich). [A. N. S. P., No. 6141.] *Paratype*.—I ♀ ; topotypical.

***Scatophila variabilis* n. sp.**

Black; halteres white. Wings faintly brownish becoming diluted inferiorly, with clear spots as follows: a large one in submarginal above post. c. v. and one at apex of the cell, two in first posterior beyond post. c. v., a large one each side of post. c. v., and one below apex of fifth vein. Opaque, at most slightly shining, generally brownish- or grayish-dusted. Frons greenish anteriorly. Face and cheeks densely white. Mesonotum with gray or greenish stripes as follows: two medianly, abbreviated posteriorly, one laterad of dorso-centrals, abbreviated anteriorly, and one on each lateral margin. Scutellum grayish with white apical spot. Face with two or three bristles each side which are curved dorso-laterally. *Length*.—2 mm.

Type.—♂ ; Berkeley Hills, Alameda County, California, April 11, 1909 (E. T. Cresson, Jr.). [A. N. S. P., No. 6140.] *Paratypes*.—27 ♂, 30 ♀ ; topotypical.

There is a possibility of this being conspecific with the European *despecta* Haliday, but I am unable to compare specimens.

A new Species of *Tropidia* (Syrphidae) from Montana (Dipt.).

By H. L. SEAMANS, Bozeman, Montana.

In the Syrphid collection of the Montana Experiment Station there were several specimens of this insect all collected in Bozeman, on June 20, 1906. There are no notes concerning this particular collection, nor have any specimens been located in all the material collected since that time in the vicinity of Bozeman. In 1916, specimens of this fly were sent to Chas. W. Johnson, at Boston, who determined it as a new species of *Tropidia* and returned the specimens to this office. Since that time no species of *Tropidia* has been described, so far as is known, which corresponds to this one. Though it runs near *quadrata* in the key to the species of *Tropidia* published by Hunter, in Entomological News (Vol. 7, p. 215), it is entirely different and can be readily separated from that species.

The following description was made from two type specimens, one of each sex, and 18 paratypes, nine of each sex, all perfect specimens. In honor of Prof. R. A. Cooley, of the Montana Experiment Station and State College, the name of *cooleyi* is suggested for this species.

Tropidia cooleyi sp. nov.

Front in both sexes golden sericeous except for keel of carina, and oral margin, which are shiny black; vertex darker than front, covered with a long, dark pile; cheeks and occiput with covering of yellow pile; antennae black, or brown sericeous, first and second segments each with one or more small spines, third segment rounded. Carina of male more acute than that of female, which appears as a rounded, almost globular protuberance below the antennae.

Dorsum of thorax for the most part black, with a narrow median stripe of gray flanked by two broader bands of gray extending almost or quite to the scutellum, and with gray bands bordering the pleura; entire thorax covered with golden yellow pubescence. Scutellum shining black, or with tip ochraceous.

Abdomen black, sparsely covered with yellow pile; sometimes in females with two more or less distinct grayish spots on second segment.

Legs black; all knees yellow or ochraceous; hind tibia, and sometimes middle tibia with distinct ochraceous band about the middle; hind femur with distinct depression on anterior face near distal end; and equipped at lower distal portion of this depression with a distinct row of short, black spines in the female, and from one to five spines in the male; all legs covered with yellow pile.

Wings hyaline, projecting a short distance beyond the tip of abdomen. Length from 6 to 7.5 mm.

Sarcophaga haemorrhoidalis Larvae as Parasites of the Human Intestine (Dipt.).*

By L. HASEMAN, Columbia, Missouri.

Dipterous larvae play a much more important role as parasites of man than is generally supposed. Numerous records are available showing some of the most important types of myiasis, but many cases are never brought to the attention of the medical profession at all. Leuckart in his "Parasites of Man" refers to cases of intestinal myiasis caused by the larvae of *Anthomyia* and to the parasitic work of *Musca vomitoria* and *Sarcophaga carnaria* in neglected wounds. Riley and Johannsen in their "Medical Entomology" review briefly a number of cases of myiasis in man. Intestinal myiasis seems to be due in most cases to the so called rat-tailed maggots (*Eristalis*), the larvae of Anthomyiidae, Muscinae and Sarcophagidae. Myiasis of the urinary tract is apparently due in most cases to larvae of *Fannia*. In recent years the writer's attention has been called to three cases of intestinal myiasis due to rat-tailed maggots, one due to the larvae of *Sarcophaga haemorrhoidalis*, and one case of myiasis of the urinary tract in which two *Fannia* larvae were passed by a small boy, one of which pupated and later emerged as the adult. The case of intestinal myiasis due to the larvae of *Sarcophaga haemorrhoidalis* has proven to be a most unusual one.

In the summer of 1915, the writer received through Dr. Jones, State Bacteriologist, a vial of preserved dipterous larvae from Dr. A. L. Lewis, of Sumner, Missouri, who reported that they had been passed by a patient. The writer asked Dr. Lewis to send living material for breeding if he succeeded in securing additional specimens and to make sure about the original source of the larvae. This request was later complied with, but the larvae were dead, having been sent in a stoppered bottle. In July, 1916, Dr. Lewis secured another supply of the larvae, which he kept in a breeding cage until they pupated and later emerged as adult flies. These were received in July

*Read at the New York meeting of the Entomological Society of America, Dec., 1916.

and samples were forwarded to the Bureau of Entomology and Dr. Aldrich identified them as *Sarcophaga haemorrhoalis*.

In order to learn more about the case, the writer went to Sumner to consult further with Dr. Lewis and to interview the patients. The family, consisting of husband, wife, daughter and son, moved to Sumner in 1914 and since that time Dr. Lewis attended them. The husband was a strong, active man; the wife was slight but active and somewhat nervous; the daughter of nine and son of six were strong, healthy children inclined to outdoor life. The husband had never been affected to his knowledge, but the wife had had attacks each summer for the past six years excepting 1916. The daughter had had a number of attacks, including one in 1916, at which time she passed the larvae which were bred for determination. The son had had one attack when about three years old. The husband's work called him from home most of the time during the summer and the wife was inclined to leave food on the table from meal to meal and to serve cold meals.

The home surroundings were found to be similar to those of the average home in a small country town. The house was a small cottage, screened and in average condition as regards repairs. The front yard was small and densely shaded by soft maple trees. The lot extended back some two hundred feet to a railroad. The family drank well water and in the garden was an open closet. The wife seemed to be a neat housekeeper, but had the reputation of being negligent about the cooking and handling of foods.

So far as it was possible to determine, the diet of the family was well balanced. Considerable meat was used, but not to excess. Cooked vegetables were commonly used cold for supper and cold prepared meats were also extensively used. Cheese was also used in considerable quantities. There seems to have been nothing unusual as regards the type of food or its preparation which would explain the reason for the repeated ingestion of the maggots, unless it be the fact that cold vegetables and cold prepared meats were more or less regularly used during the summer. The fact that during the spring, summer and fall of 1916 the advice of Dr. Lewis to warm

up all meats and vegetables immediately before eating them, was strictly followed, with the result that the mother escaped the pests and the daughter had only one light attack, would seem to show that the use of exposed cold foods was responsible for the trouble.

The larvae are undoubtedly ingested, though it is difficult to explain why this one family should continue to have trouble when many other families in the same community handle food in the same way without having trouble with the pest.

The possibility of the maggots entering the stomach by being deposited by the fly about the mouth or nostrils seems remote. The members of the family had not had catarrh troubles or faulty teeth, which might serve to attract the parent fly, and they had not practiced sleeping out of doors or otherwise exposed to the fly.

The trouble has been worse during the heat of the summer, though it has, in cases, occurred early in June and as late in the fall as October. The greatest trouble comes when the flies would be expected to be most abundant.

The first signs of trouble are noted a day or more previous to the real attacks or the time at which medical aid is required. In the base of the stomach or in the region of the transverse colon a sensation similar to a rolling mass is felt. Later this changes to gripping which is accompanied by some fever and in some cases by nausea. In case of the mother this is followed by much nervousness and at times by spasms. After medical assistance is given and the maggots are passed, the temperature falls, though in case of severe attacks pain in the bowels continues for some time and may not entirely disappear until another attack comes on. The maggots may not all be passed at one time and usually mature as well as immature larvae are passed at the same time.

In one case, before the family moved to Sumner, the mother was placed on a grape-nuts diet for a month and throughout that period trouble continued and larvae were passed. Grape-nuts without milk or sugar and only boiled water were used. Sugar or other sweets had the effect of bringing on cramps and a regular attack. This experience led the patient to the

erroneous assumption that the larvae were reproduced in the stomach or intestines and not ingested from time to time. From the fact that larvae were passed for a month when there was no chance of ingesting new supplies, would lead one to conclude that the larvae may remain in the alimentary canal for a considerable length of time.

The peculiar rolling motion is undoubtedly the crawling of the mass of mature larvae seeking to escape. The eating of sugar or other sweets probably aggravates the larvae and causes them to move about in an attempt to escape. The severe attacks are usually followed by the passing of large numbers of maggots. The patient estimated the quantity of maggots at fully a cup-full in severe cases.

Since the trouble is undoubtedly due to repeated ingestion of living larvae—the fly deposits larvae rather than eggs—the protection of food or the heating of meats and vegetables immediately before eating them should give complete relief. Once the larvae are present in the alimentary canal, the taking of salts, oil, or other laxatives results in the discharge of the larvae. The calling of a physician was usually delayed until the last moment and in some cases the injection of an opiate was necessary.

A laxative taken as soon as the presence of the maggots in the stomach is noted would probably relieve much of the later trouble. The larvae are not affected either by salts or oil, but both the mature and immature larvae are alive when passed. The necessary oxygen is undoubtedly secured from the food or the air taken in with the food.

While it has not been possible to determine definitely just how the larvae enter the alimentary tract of the patient, it seems that they are undoubtedly ingested from time to time on exposed cold and perhaps partly spoiled meats or vegetables. They may remain in the alimentary tract several days and when they are mature or approach maturity they bring on severe cramping and in some cases spasms. Relief comes after they have been discharged. The family will be kept under observation in order to determine more definitely how the larvae are taken in and how long they feed in the alimentary tract.

A List of the Butterflies of Iowa.

By A. W. LINDSAY, Iowa City, Iowa.

In preparing a review of the butterflies of Iowa the writer has had occasion during the past few months to examine most of the collections now in existence in the State and the local lists heretofore published. After examining the collection on which the most extensive of the latter was based it was very evident that records could not be taken from these lists without verification and that the literature previously sent out from the State was deplorably inaccurate. The work of compiling this list has therefore been carried on with two things in mind; first, the examination of all material obtainable in the State and second, the correction of such errors as have been published in the several local lists used.

The collections examined represent the work of from one to thirty years, and in most cases are fairly complete for the localities which they represent. They are in the possession of the following persons and institutions and were made in the neighborhood of the towns where they now repose.

- (1) Mr. A. F. Porter, Decorah, Ia.
- (2) Mrs. J. E. Hoopes, Muscatine.
- (3) Prof. H. F. Wickham, Iowa City.
- (4) Dr. G. L. Stempel, Macedonia.
- (5) Coe College, Cedar Rapids.
- (6) Grinnell College, Grinnell.
- (7) The writer's collection made in Woodbury and Dickinson Counties.

In addition to these, lists have been furnished by Mrs. O. F. Hiser, Nevada, Ia., and Mr. F. M. Holmes, Prescott, Ia., and Mr. R. L. Mayhew, of Decatur, Illinois, has contributed the records which he made at Mount Pleasant, Ia. Assistance has been given by Dr. Henry Skinner, Dr. J. McDunnough, Dr. H. G. Dyar, Mr. Nathan Banks and Mr. R. A. Leussler in determining specimens and clearing up some obscure points of classification. As the list is presented here it follows the nomenclature given in Dyar's "List of North American Lepidoptera."

1. *Iphiclides ajax* Hüb. Bred in eastern and southern Iowa, very rare in the northwest. April to July.
- 1a. *I. ajax*, var. *marcellus*. Boisd.-LeC.
2. *Papilio glaucus* Linn. Rather rare in the northern parts, more common southward. May and August.
- 2a. *P. glaucus*, var. *turnus* Linn. April to September. Common everywhere.
3. *Papilio troilus* Linn. Rare in eastern and southern Iowa.
4. *Papilio thoas* Linn. Fairly common, June to September. Distribution general.
5. *Papilio polyxenes* Fab. Fairly common, May to September. Distribution general.
6. *Laertias philenor* Linn. Rare. Occasionally breeds in eastern and southern Iowa. April to July, October.
7. *Pontia protodice* Boisd.-LeC. Common throughout the warm months. Distribution general.
- 7a. *P. protodice*, var. *vernalis* Edw. Rare.
8. *Pontia rapae* Linn. Very abundant everywhere during all the warm months.
- 8a. *P. rapae*, var. *immaculata* Skinner and Aaron. Rare.
9. *Nathalis iole* Boisd. Fairly common everywhere. July to October.
10. *Callidryas eubule* Linn. Occasionally common. August and September. Distribution general.
11. *Zerene caesonnia* Stoll. May to October, common after July. Distribution general.
- 11a. *Z. caesonnia*, var. *rosa* McNeill. Rare during September.
12. *Eurymus eurytheme* Boisd. Common in all parts of the State from May to October. Albino females fairly common.
- 12a. *E. eurytheme*, form *eriphyle* Edw. Fairly common during the late summer.
- 12b. *E. eurytheme*, form *keewaydin* Edw. Fairly common during the early summer.
13. *Eurymus philodice* Godart. Very common, May to Oct. Distribution general.
14. *Pyrisita mexicana* Boisd. Found in all parts of the State but the northeast. Very rare. July to Oct.
15. *Eurema nicippe* Cramer. Rare in southern Iowa and along the Mississippi. June.
16. *Eurema euterpe* Ménétries. Fairly common throughout the State. July to Oct.
17. *Agraulis vanillae* Linn. Two specimens in Mr. Porter's collection are the only ones located, though the species is undoubtedly to be found in the southern part of the State. The two were taken late in June.

18. *Euptoieta claudia* Cramer. Common everywhere from May to Oct.
19. *Speyeria idalia* Drury. Fairly common from the middle of June to Oct. Distribution general.
20. *Argynnис cybele* Fab. Abundant. Flies from June to Oct. Distribution general.
21. *Argynnис aphrodite* Fab. A few specimens have been seen in eastern Iowa. The only dates available are from July 10-25.
- 21a. *A. aphrodite*, var. *alcestis* Edw. Fairly common throughout the State, apparently displacing *aphrodite* in the western half. June to Oct.
22. *Brenthis myrina* Cramer. May to Sept. Distribution general. Rare in northwestern Iowa, but fairly common in other parts.
23. *Brenthis bellona* Fab. Fairly common in the northern half of the State only. May to Aug.
24. *Euphydryas phaeton* Drury. Accepted on the authority of Prof. Herbert Osborn ("A Partial Catalogue of the Animals of Iowa," Ames, 1892) and Dr. Stempel. Said to occur in southeastern Iowa. Rare. No dates recorded.
25. *Charidryas nycteis* Doub.-Hew. Common in all parts of the State. May to Aug.
26. *Charidryas ismeria* Boisd.-LeC. May to Sept. Distribution general. Fairly common.
27. *Phyciodes tharos* Drury. Fairly common in May. Taken in all parts of the State.
- 27a. *P. tharos*, var. *morpheus* Fab. Same distribution. Very common from June to Oct.
28. *Phyciodes batesii* Reakirt. Rare. Two specimens which are undoubtedly *batesii* were taken at Sioux City in June, 1909 and 1915. The species must be present in the eastern part of the State.
29. *Mestra amymone* Ménétrries. A single stray, not dated, taken by Dr Stempel near Macedonia, is the only record of this species.
30. *Polygonia interrogationis* Fab. Fairly common. June and July. Distribution general.
- 30a. *P. interrogationis*, var. *umbrosa* Lintner. Common.
31. *Polygonia comma* Harris. Very common during the warm months. Found throughout the State.
- 31a. *P. comma*, var. *dryas* Edw. This variety makes up a part of the summer brood of *comma* and is found from June to Aug.
32. *Polygonia progne* Cramer. Rare. Distribution general. Aug.
33. *Eugonia j-album* Boisd.-LeC. Southeastern Iowa. Rare. The

- only dates available are July 10-25, 1869. (Scudder, Trans. Chicago Acad. of Sciences, 1869).
34. *Euvanessa antiopa* Linn. Early spring, June and July, and from late August until cold weather. Fairly common. Distribution general.
 35. *Aglais milbertii* Godart. One specimen was seen in Plymouth County in July, 1909.
 36. *Vanessa atalanta* Linn. Very common everywhere throughout the warm months.
 37. *Vanessa huntera* Fab. Fairly common in all parts of the State. May to Oct.
 38. *Vanessa cardui* Linn. Usually very common. Found in all parts of the State during the warm months.
 39. *Junonia coenia* Hüb. Rare. June to Sept. Distribution general.
 40. *Basilarchia astyanax* Fab. Common in all parts of the State from June to Sept.
 41. *Basilarchia archippus* Cramer. The same things may be said of this species, though it is somewhat less common.
 42. *Chlorippe celtis* Boisd.-LeC. Very common from June to Sept. Distribution general.
 43. *Chlorippe clyton* Boisd.-LeC. June to Sept. This species is less common than *celtis*, but is found wherever its food plant grows.
 - 43a. *C. clyton*, var. *proserpina* Scud. Fairly common among the adults emerging late in the season. Most of the specimens from the northern part of the State are dark inter-grades rather than typical *clyton* or *proserpina*.
 44. *Anaea andria* Scud. Two undated specimens at Macedonia are the only ones seen in the State.
 45. *Cercyonis alope* Fab. Rare in southeastern Iowa. July and Aug.
 - 45a. *C. alope*, var. *nephele* Kirby. Common everywhere during July and August.
 46. *Enodia portlandia* Fab. Sometimes very common. June to Sept. Distribution general.
 47. *Satyrodes canthus* Linn. Rare. Taken throughout the State. June and July.
 48. *Cissia eurytus* Fab. Common everywhere from June to Aug.
 49. *Anosia plexippus* Linn. Common throughout the warm season in all parts of the State, and sometimes extremely abundant.
 50. *Anosia berenice*, var. *strigosa* Bates. A single female has been reported from Cass County, taken on Aug. 31. (Mr. F. C. Pellett. Proc. Ia. Acad. Science, XXI, 347, pl. xxxvi).

51. *Hypatus bachmanni* Kirtland. Found during July in the southern part of the State, but rather uncommon.
52. *Hypatus carinenta* Cramer. Strays of this species reach even the northern and eastern parts of Iowa occasionally, appearing in Aug. and Sept.
53. *Uranotes melinus* Hüb. Rare. Aug. to Oct. Distribution general.
54. *Thecla acadica* Edw. Fairly common in the southern half of the State and occasionally found in the northeast. June.
55. *Thecla edwardsii* Saunders. Recorded at Sioux City in July. Rare.
56. *Thecla calanus* Hüb. Common all over the State in July.
57. *Thecla liparops* Boisd.-LeC. Very rare. A few specimens reported from Story, Pottawattamie and Franklin Counties. July.
58. *Incisalia henrici* G. & R. Five specimens in the collection of Dr. Stempel. May.
59. *Strymon titus* Fab. Rare. Distribution general. July.
60. *Feniseca tarquinius* Fab. Recorded at Decorah alone. Rare.
61. *Gaeides dione* Scud. Rather uncommon. July. Distribution general.
62. *Chrysophanus thoe* Boisd. Fairly common. July and Aug. Distribution general.
63. *Epidemia helloides* Boisd. Taken in the northern part of the State in June and July. Uncommon.
64. *Heodes hypopleas* Boisd. Common in southeastern Iowa. July to Oct.
65. *Rusticus melissa* Edw. Very common in Dickinson County and ranging east in small numbers to the Mississippi. June to Sept.
66. *Cyaniris ladon* Cramer. Fairly common from June to Sept. Distribution general.
- 66a. *C. ladon*, var. *violacea* Edw. Spring form, appearing in Apr. and May.
- 66b. *C. ladon*, var. *neglecta* Edw. Summer form. Aug. and Sept.
67. *Everes comyntas* Godart. Common throughout the State. May to Oct.
68. *Hemiargus isola* Reakirt. Fairly common in western Iowa, extending east to Linn County. July to Sept.
69. *Amblyscirtes vialis* Edw. Distribution general. May to July. Fairly common.
70. *Amblyscirtes samoset* Scud. Eastern Iowa in June and July. Rare.
71. *Ancyloxypha numitor* Fab. June to Sept. Distribution general. Common.

72. *Oarisma poweshiek* Parker. Recorded in Story, Dickinson and Poweshiek Counties in July. Rare.
73. *Poanes massasoit* Scud. Taken in Poweshiek and Story Counties. Rare. No dates.
74. *Atrytone hobomok* Harris. Fairly common in all parts of the State during late May and early June.
75. *Erynnis comma*, var. *colorado* Scud. Very rare. Mr. Porter has taken three specimens at Decorah.
76. *Erynnis pawnee* Dodge. Rare. Taken in Poweshiek and Woodbury Counties in Aug. and Sept.
77. *Erynnis sassacus* Harris. Crawford County, mid-July, one male. (Scudder, Trans. Chicago Acad. of Sciences, 1869).
78. *Anthomaster leonardus* Harris. Audubon County in Sept., Scott and Winneshiek Counties. Very rare.
79. *Hylephila campestris* Boisd. Rare. June to Sept. Distribution general.
80. *Thymelicus mystic* Scud. Taken in June. Rare. Distribution general.
81. *Thymelicus cernes* Boisd.-LeC. Common in all parts of the State. May to Aug.
82. *Thymelicus otho*, var. *egeremet* Scud. Fairly common during July. Distribution general.
83. *Polites peckius* Kirby. Common everywhere. Flies from May to Sept.
84. *Euphyes verna* Edw. Occurs in small numbers in most of the collections seen. June and July.
85. *Euphyes vestris*, var. *metacomet* Harris. Fairly common everywhere. July and Aug.
86. *Lerema hanna* Scud. Very rare. A few Iowa specimens are in the collection at Grinnell. No dates.
87. *Limochroes bimaculata* G. & R. There are two females labelled "July 4, 1890. Poweshiek Co." in the Grinnell collection.
88. *Limochroes pontiac* Edw. Southeastern Iowa in July. Rare
89. *Limochroes manataqua* Scud. Two males and one female taken at Sioux City in early July are the only specimens seen by the writer.
90. *Phycanassa vitellius* Fab. Rather rare throughout the State. July.
91. *Phycanassa arogos* Boisd.-LeC. Throughout the State in July. Fairly common.
92. *Epargyreus tityrus* Fab. Common. June to Sept. Distribution general.
93. *Thorybes bathyllus* S. & A. Rare in the Mississippi valley. No dates.

94. *Thorybes pylades* Scud. Common everywhere in June and July.
95. *Pholisora catullus* Fab. Common everywhere. June to Sept.
96. *Pholisora hayhurstii* Edw. Very common in the northwest. Collections in the southern half of the State show a surprising absence of this species. June to Sept.
97. *Thanaos brizo* Boisd.-LeC. One specimen at Muscatine. It is reported from Omaha, Nebraska, as occurring rarely in April and May (Mr. R. A. Leussler, Ent. News XXIV, 352, 1913) and so may be expected in southwestern Iowa.
98. *Thanaos persius* Scud. Rare. Distribution general. May to July.
99. *Thanaos martialis* Scud. Fairly common. Distribution general. Occurs in July.
100. *Thanaos juvenalis* Fab. Common. May to Sept. Found throughout the State.
101. *Thanaos horatius* Scudder and Burgess. Rare. There are a few specimens at Grinnell and two taken at Sioux City in the writer's collection. The latter were taken on June 23 and July 24.
102. *Hesperia montivaga* Reakirt. Very common in all parts of the State from May until late fall.

In presenting this list the writer wishes again to emphasize the fact that no records are used without adequate proof of their accuracy. The two exceptions are, it seems, amply explained. Where doubtful specimens have come to hand they have been referred to authorities. Thus the list has been made as complete and as accurate as possible and it is now offered to the world as a contribution from the Lepidopterists of the State of Iowa.

Medal Awarded for Entomological Research.

The Crisp Medal and an award of £30 by the Council of the Linnean Society of London have been bestowed upon Mr. R. J. Tillyard (not Hilliard as incorrectly announced in *Science* for July 14, 1917), Linnean (New South Wales) Macleay Fellow in Zoology, acting lecturer and senior demonstrator in zoology at the University of Sydney, New South Wales. The award is given once every five years to a fellow of the Linnean Society for the best piece of microscopic research published by the Society, in this case a paper entitled "A Study of the Rectal Breathing Apparatus in the Larvae of Anisopterid Dragonflies (Journ. Linn. Soc. Lond. xxxiii, 127-196, pls. 18-22, 21 text figs. Nov., 1916). Mr. Tillyard is the author of many other papers, chiefly dealing with Australian Odonata, and of a book just published at the University Press, Cambridge, England: "The Biology of Dragonflies (Odonata or Paraneuroptera)," 1917, which we hope to review in a later number of the *News*.

Life History of the Northern *Microvelia*—*Microvelia borealis* Bueno (Hem., Het.).

By J. R. DE LA TORRE BUENO, New York City.

(Plate XXV.)

Every miniature Sargasso sea of matted algae floating their green meshes on still pools, every field of duck-weed in mill ponds, affords shelter to a myriad forms, to a teeming busy population, some preyed upon, others predators. Swarming over these moist fields one finds a series of water-bugs—Acanthias, Mesovelias, Naeogeids, Veliids. One species of the last-named family is perhaps the most abundant of all.

For many years this little *Microvelia* masqueraded in our catalogues and lists as *Microvelia pulchella* of Westwood, which was described originally from St. Vincent's. At last it became possible to fix its status definitely and it was described as new in 1916 under the name *borealis*.¹ The paper in which it was described cleared up the synonymy and distribution of this group of atoms and fixed the name of the present species thus:

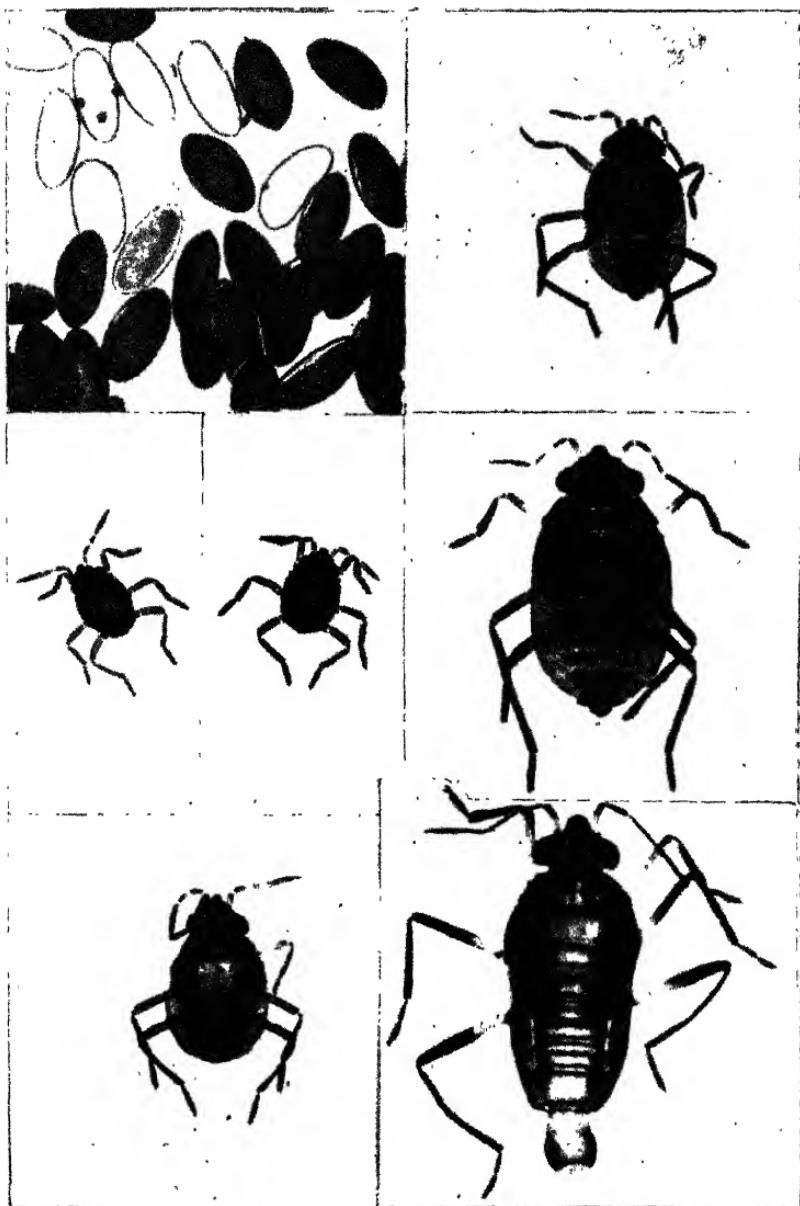
Microvelia borealis Bueno
= *pulchella* Uhl.?, Bueno, Heid., Van D., nec
Westwood.
= *boreale* Bueno, in various lists.
= *marginata* Kirk. & Bueno, nec Uhl.

Probably owing to not having seen the paper in question, the synonymy of our Eastern species in Van Duzee's new Check List leaves much to be desired.

Microvelia borealis has a limited range, so far as known to me, doubtless because little collected. I have taken it in this State and New Jersey, and Parshley has got it from Maine. It must be very widely distributed, but being so small it is unnoticed, or else taken for an immature bug on account of its generally apterous condition and small size.

Microvelia borealis awakes from its winter sleep some time in the spring, how early I am unable to say, as I have never taken it before May, when it begins to populate the watery

¹ Bueno, Bull. Brooklyn Ent. Soc. XI: 57.



MICROVELIA BOREALIS—BUENO.

wastes of the ponds. Nymphs appear early, and have only four molts, a fact repeatedly tested under varying conditions. This is specially noteworthy, as the general rule in the Heteroptera thus far observed is five molts, exceeded when there is variation and equaled in the single instance known to me, of *Riptortus linearis*, one of the Alydids of India, as recorded by Kirkaldy and Kershaw.²

When the species was first bred in 1904 I thought there was some error in counting the molts. It was again raised in 1905, with the same result. Finally, in 1908, it was once more bred under carefully controlled conditions; a batch of ova was separated in a small aquarium, and as each nymph emerged it was separated in a small Stender dish. A careful record of the dates of molting was kept on its ground glass cover as well as in my note book. My previous results were fully confirmed.

The complete transformations in my aquaria took place in varying periods of from 22 to 59 days for the full cycle from oviposition to adult, or from 14 to 49 days for the nymphal instars. However, the majority run between 14 and 18 days for the nymphal instars, or somewhere between 22 and 25 days for the period from oviposition to maturity. Neither the sex nor the period of the summer seems to make any difference in the developmental period. In midsummer the molts are between 3 and 5 days apart, the maximum for any one molt being 11 days and minimum 2, but no one instar seems to take longer than any of the others *per se*. During the summer, broods overlap, as oviposition is continuous, and taking four weeks as an average, it makes possible say five to six generations in a season, from early May to late September.

As the days grow colder in late summer and early fall they begin to grow less in number, and finally they disappear for the winter. However, under favorable climatic conditions, this species may breed throughout the year. A few were kept in an aquarium through one winter. It was near a window, and the room being in a steam-heated apartment was warm. They

² 1908 J. C. Kershaw and G. W. Kirkaldy, Tr. Ent. Soc. Lond., pp. 59-62 "On the Metamorphosis of Two Heteropterous Hemiptera from Southern China," pls. iv and v.

bred and the young emerged in due course. The aquarium swarmed with waterfleas; as there was no other food the Microvelias doubtless fed on the many Daphnias entrapped in the surface film. By the end of the following April there were nine adults in the aquarium and a very few nymphs.

This little species feeds on dead or waterlogged insects in the water, which it attacks in numbers, as observed in these experiments. Its small size prevents it from successfully coping with living insects larger than itself.

The chief structural peculiarities that distinguish it from the other species, aside from its small size and antennal characters, are the nearly orbiculate shape of the apterous female and the curved posterior tibiae of the male. It is most frequently found apterous, but the winged form is not rare. It walks ordinarily in little staccato steps, although at times it runs, especially when pursued off the duckweed into the open pond, when it races out and curves rapidly back. Its habits in general are like those of *Microvelia americana*, elsewhere³ described, as well as the details of breeding, preparing for the microscope, etc.

No parasites of *Microvelia* appear to be known. Its internal anatomy is also to be studied.

The egg is clear pearly glistening white when just deposited; elliptical; about one and one-half times as long as broad. The chorion is apparently smooth seen under a low power ($\times 60$), but under a higher ($\times 320$) appears rather sparsely punctulated in lines. Size (from freshly deposited eggs) long, .45mm.; lat., .3 mm. This is an average dimension, as it sometimes varies quite markedly.

As development progresses, the egg grows darker and shortly before emergence the folded up embryo is visible through the translucent chorion. As already noted, the eggs are deposited on the under surface of duckweed, the head end generally pointing to the edge, although if this plant be not available they will deposit them anywhere, embedded in a clear waterproof jelly or glue secreted by the female for this purpose. The females carry two mature ova at a time, which seem to practically fill up the entire body cavity. In hatching, the egg splits along a straight line 4-7 of its length and through this the nymph escapes. Although looked for, no casting of the amnion or

³ 1910, Bueno, Can. Ent. vol. xlvi, 176-186, "Life Histories of American Water Bugs, iii, *Microvelia americana*."

molt on emerging has been observed. The embryonic period has been noted as lasting from 7 to 23 days, but the controlled lot took only the former time, and the majority took only 8 days for development.

Nymph, First Instar.—Antennae rather stout but long, joint 4 longest, 2 and 3 shortest and equal, 1 slightly longer; 2 and 4 stoutest, 4 fusiform, 3 pedicellate at base expanding to tip, club-shaped. Eyes small, round, set very far apart owing to broad head. Rostrum stout, joint 2 shortest, 3 longest, then 4, then 1, which is stoutest, 2 is ring-like, 3 is more or less long ovoid. 4 slenderest, pointed tapering. All legs are equally stout and comparatively long; all tarsi are 1-jointed, all tibiae have combs at the distal end. Fore tibiae shorter and stouter than femora; tibia and femur of intermediates subequal; hind tibiae longer than femora, which have slender long spines or stiff hairs. Tarsal claws long, slender, simple.

The little bugs have a family resemblance to the adult—they are rounded posteriorly and the legs and antennae are much thicker in proportion than in the adult. The abdomen is comparatively short and the legs in consequence appear set very far back. When fully set, the nymph is very dark, a deep slate grey. In molting, the entire top of the head lifts off like a lid hinged at the clypeus, and the skin splits from the thorax through the abdomen.

In this and the succeeding instars, much of the descriptions has been taken from balsam mounts and from cast or molted skins.

The first instar lasted from 2 to 11 days, the controlled brood took 6.

Nymph, Second Instar.—In this instar the second antennal joint is the shortest, 4th longest and stoutest, nearly as long as the other three taken together, and 1st and 3d equal. The rostrum is as before, except that joint 2 is narrower and more ring-like, joint 3 longest, but little longer than 4 and twice as long as 1. The abdominal segments are ring-like, telescoped; the abdomen is very short and truncate, but comparatively longer than in the preceding instar, so the legs do not appear set so far back. The legs are as before, except that the femora of the second pair are longer than the tibiae. The molt is as in the preceding instar.

The second instar lasts between two and six days, the majority taking 3 or 4 days.

Nymph, Third Instar.—The antennae continue as before proportionally, but the second joint is but slightly shorter than the 1st and 3d and the 4th is one-fifth shorter than the other three taken together; joint 3 is slenderest, but all are nearly of equal thickness. Rostrum as before. The legs are slenderer but otherwise as before; the second and third tibiae are slenderer than the femora. The chief visible changes are in the proportions of thorax and abdomen, which is much longer actually and comparatively, and the segments are more distinct.

Microvelia borealis Bueno. Tabulated Life Histories (Record of 14 Bred Specimens).

This instar is between three and six days long, but most took three days.

The male nymph was distinguishable in this instar by the more pointed abdomen.

Fourth (and Last) Nymphal Instar.—Antennae noticeably more slender but not so long in proportion; proportional length of joints as before; joints nearly of equal thickness except 1 and 2 a little stouter, 4 fusiform, pointed, all set with pile and long hairs. Rostrum as before, except that it is more slender and longer, reaching first coxae. The legs are also longer and more slender; first femora longer and thinner than tibiae, intermediates subequal and hind tibiae slender and longer than femora. In the cast skins the curvature of the hind tibiae of the male begins to be noted. All tarsi are still 1-jointed without any sign of a suture, although 2-jointed in the adult. Pro- and mesothorax are distinct. Abdomen is much longer, nearly equal in length to the thorax, pointed, male genital segment prominent; general form is oval.

This instar lasted between four and ten days, the majority molting in 4. This brings the insect to the adult, as noted.

While emerging from the cast skin in this last molt and directly after, *M. borealis* is very white with brown markings. The head is tinged with brownish with a white median line; the thorax is whitish; the first and second abdominal segments are brown to within a quarter of their width of the connexivum; the third, fourth and fifth are more narrowly marked, and the 6th and 7th are brown to the connexivum. The connexivum has a brown edge at the inner margin narrowing cephalad and caudad. The black and dark bluish grey mature coloration is attained fully in not over ten hours. The eyes at moulting, however, are nearly black and very conspicuous by contrast.

This little insect is comparatively simple to rear and its smallness makes it an excellent object to examine living under the microscope. Much remains to be found out about it. What is its respiratory system? Where are its spiracles, unrevealed even in the cast skins? How many eggs does each female lay? Many other questions will occur to the experienced biologist, unanswered in what precedes.

PLATE XXV.

Life History of Microvelia borealis Bueno.

Ova		Nymph	Third Instar
Nymph First Instar		"	Fourth "
" Second "		Adult Male	
all X 20. Microphotographs by Mr. Chris. E. Olsen.			

A new Species of Myrmecophilous Blattid. (Orthoptera; Blattidae; Corydiinae).

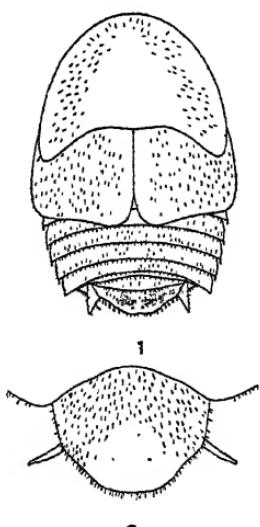
By MORGAN HEBARD, Philadelphia, Pa.

Recently specimens of a species of roach were sent us by Professor W. M. Wheeler, which are found to represent a new species of the genus *Myrmecoblatta* Mann. This genus was placed in the Blattinae, the valvular type of female subgenital plate, in part, being responsible for this assignment. The unarmed ventral femoral margins and other features prevent this association. The genus is clearly nearest *Compsodes* Hebard,¹ and likewise referable to the Corydiinae.

MYRMECOBLATTA Mann.

1914. *Myrmecoblatta* Mann, Psyche, XXI, p. 172.

GENOTYPE, by monotypy, *Myrmecoblatta rehni* Mann, described from Guerrero Mill, Hidalgo, Mexico.



Myrmecoblatta wheeleri new species Type. ♂
Fig. 1.—Dorsal view. (x 10.)
Fig. 2.—Ventral view of subgenital plate (greatly magnified).

The following generic features should, in our opinion, be emphasized: Surface of insect supplied with moderately numerous, short, minute hairs. Ocelli absent. Antennae with first joint large, about twice as long as broad; second joint not as wide, subquadrate; third joint slightly longer than wide; succeeding ten joints not as long as wide.² Maxillary palpi with distal joint nearly twice as long as penultimate joint, distal truncation weakly oblique. Clypeus produced, with apex bluntly rounded, concealing the mandibles. Pronotum with disk evenly convex, lateral (and cephalic in male) portions weakly concave; pro-

¹ 1917. Mem. Am. Ent. Soc., 2, p. 208.

² One specimen before us, with a complete antenna, shows twenty-five joints in all.

notum extending considerably beyond the head in male, leaving the vertex briefly exposed in female. Tegmina present, reduced, with venation subobsolete, in male; absent in female. Wings greatly reduced in male, absent in female. Cerci tapering to acute apex. Subgenital plate of male symmetrical, with similar, simple, straight, elongate, cylindrical styles, situated in sockets latero-distad, with distal margin of plate between these somewhat produced, convex.³ Subgenital plate of female valvular, with basal margins of valves straight, convergent, to the rather broadly rounded apex.⁴ Ventral femoral margins unarmed, supplied with a few scattered hairs; median and caudal femora supplied with a rather delicate distodorsal genicular spine.⁵ Tibiae with external faces supplied with numerous short bristles, median and caudal tibiae there furnished with a few spines; all of the tibiae armed with distal spines. Tarsal joints elongate and slender, those of the caudal limbs nearly equaling the caudal tibiae in length. Caudal metatarsus fully as long as the remaining joints. Pulvilli and arolia absent.

Myrmecoblatta wheeleri new species.

Compared with *M. relni*, the male of the present species is found to differ in the pronotum, with latero-caudal angles more sharply rounded; shorter and truncate tegmina; more reduced wings; much shorter supra-anal plate and much shorter cerci, with articulations subobsolete. From the single immature female of the present species before us we can only determine that females of *wheeleri* are separable from those of *manni*, as are males, by the much reduced cerci, with articulations subobsolete.

TYPE: ♂; San Lucas Toliman, Solola, Guatemala. January 3, 1912. (W. M. Wheeler.) [Hebard Collection, Type No. 440.]

³ In these features showing considerable resemblance to the Corydiine genera, *Compsodes* and *Latindia*. These genera, in these respects, showing a similarity to the normal Blattinid type.

⁴ In this respect much closer to the normal V acute-angulate type found in the Corydiine genera, *Holocompsa* and *Compsodes*, but showing some divergence toward the type normal in the Blattinae.

⁵ Mann failed to note the absence of the genicular spine on the cephalic femora, a condition found throughout the Blattidae.

Description of Type. Size minute, form broad elliptical. Head hidden under pronotum, evenly and very weakly convex from occiput to clypeus; interocular space decidedly broader than that between antennal sockets. Pronotum with latero-caudal angles acute-angulate, bluntly rounded; caudal margin rather strongly concave, except mesad where a brief and feeble convexity is indicated. Tegmina subquadrate, distal margin truncate, weakly concave; venation obsolete, except humeral trunk, which is weakly indicated. Wings minute, vestigial, with venation obsolete; anterior field oval, posterior field indicated by vestigial tissue. Dorsal surface of abdomen unspecialized; median segment extremely narrow (longitudinally); first to sixth segments with caudal margins transverse but latero-caudal angles very feebly produced, almost rectangulate, with acute apices each supplied with a bristle; seventh and eighth segments transversely narrower, the eighth with caudal margin broadly convex between the cerci. Supra-anal plate delicate in structure, bilobate, about three times as wide as its greatest length; lateral margins weakly convex convergent, armed with bristles; distal margin briefly acute-angulate emarginate mesad, with lateral portions weakly convex, curling dorsad and supplied with numerous hairs; latero-caudal angles broadly rounded.⁶ Cerci conical, extending as far as distal margin of supra-anal plate, apex acute, articulations subobsolete. Concealed genital hook situated sinistrad, elongate and slender, distal portion curved sharply dextrad, forming nearly a semicircle, with apex acute. Subgenital plate broader than long; lateral margins straight, parallel to style sockets, distal portion of plate between these moderately produced with distal margin broadly convex. Styles and limb armament as given in generic diagnosis. Pulvilli and arolia absent.

A single immature female before us shows the ocular, pronotal and cercal development similar to a male in the same instar. The subgenital plate⁷ shows indications of a distal medio-longitudinal sulcation, while from within the succeeding segment projects, showing styles similar to those of the male sex.⁸

Measurements (in millimeters).⁹

δ	Length of body	Length of pronotum	Width of pronotum	Total length of tegmen	Exposed length of tegmen	Width of tegmen	Length of cercus
TYPE.....	3.94	1.43	2.84	1.7	1.43	1.63	.34
Paratype....	4.08	1.63	2.85	1.85	1.36	1.56	.34

⁶ In texture and many features of contour, similarity with *Compsodes schwarsi* Caudell is found.

⁷ See generic diagnosis. In adult females of this species there is little doubt but that this plate is much as in *relni*.

⁸ This condition in immature females has been observed in other forms of the Blattidae.

⁹ Taken under the microscope.

Coloration. General coloration cinnamon brown, shading to ochraceous-buff rather broadly along the lateral margins of the pronotum. Underparts and limbs ochraceous-buff, strongly tinged with buckthorn brown.

In addition to the type, one male paratype and a pair of immature examples are before us. These specimens were all taken at the same time, by Professor W. M. Wheeler, from a colony of the ant, *Solenopsis gemmata* (Fabricius),¹⁰ found under a stone on the shores of Lake Atitlan.

A Second *Colletes* with Spotted Wings (Hym.).

By T. D. A. COCKERELL, Boulder, Colorado.

In 1868 Cresson described a remarkable Colletid bee from Orizaba, Mexico, having black spots on the wings. He called it *Colletes punctipennis*. Cresson had only the female, but a male was found in F. Smith's collection in the British Museum, collected in Guatemala. This I described in Annals and Mag. of Nat. Hist., July, 1914, p. 11. On April 20, 1912, Mr. Aug. Busck collected at Porto Bello, Panama, two males of a species very close to *C. punctipennis*, but with the thoracic hair very differently colored. It may possibly prove to be only a subspecies, but as no intermediates are known it is given the specific rank which it probably deserves.

Colletes spiloptera n. sp.

♂. Length about 11 mm.; wings as in *C. punctipennis*, but the rather short hair of thorax above, and of tubercles, bright fox-red (in *punctipennis* the thorax is clothed with short, dense white or hoary pubescence, that on mesothorax shortest and mixed with sparse black hairs, giving the surface a maculate appearance; scutellum with short black pubescence, margined entirely with whitish). Only middle of flagellum (joints 5-9) red beneath; mesothorax very densely punctured; second abdominal segment with punctures conspicuously smaller and denser than on first; genitalia with sagittal wings very large and rounded, stipites covered on apical part with short yellowish hair, but without any long spreading bristles. The malar space is much broader than long.

Type in the U. S. National Museum.

¹⁰ Determined by Professor W. M. Wheeler, to whom we take pleasure in dedicating the interesting myrmecophilous roach here described.

Notes on the Construction of the Cocoon of Praon (Hym., Braconidae).

By C. N. AINSLIE, U. S. Dept. Agriculture, Bureau of Entomology, Cereal and Forage Insects.*

The parasites of various aphids have been receiving much attention during recent years and their widely differing habits have proved most interesting to the students of their life histories.

In a short sketch in *Entomological News* of March, 1909, pp. 110-112, the writer described briefly a discovery he had recently made of the process by which the bodies of aphids, killed by the attack of their Aphidiine enemies, are fastened by the larvae of the parasite to a firm base, thus affording the larvae a reasonably secure shelter during the period of pupation. This discovery was made by using the exceedingly simple device of inverting upon the stage of a microscope a slide on which the aphid was being glued after the larva had split ventrally the abdomen of its dead host. Through the slide thus placed the movements of the larva could be readily watched as it smeared the torn edges of the aphid's body-wall to the glass with a generous supply of a viscous fluid. Previous to this observation, made nearly nine years ago, no one seems to have been able to solve the mystery of this attachment of the dead body, although the entire operation had frequently been carefully watched, from above. The process as then detailed has been since confirmed by Mr. E. O. G. Kelly, of the Bureau of Entomology, and by other observers as well. It appears to be a well established fact that nearly all the braconid parasites of aphids fasten their former hosts to a base in much the same manner.

On the other hand the *Aphelinus*-parasitized bodies of aphids are anchored without the abdominal rent. Just how this is accomplished is not yet definitely known since it can be learned only by means of circumstantial evidence. It seems likely that a certain amount of an adhesive fluid is in some manner forced through the stomata or other pores in the body-wall and thus

* Published with the permission of the Secretary of Agriculture.

the ventral surface is glued fast to its support. Inasmuch as the Aphelininae attack only the short-legged and smaller-bodied species of aphids, it must be much easier for their larvae to anchor the bodies of their hosts than for those parasites that prey on the longer-legged forms like *Macrosiphum* and *Rhopalosiphum*. But even these larger forms are often fastened to leaves and grain blades by their internal parasites. As the process has never been watched, so far as I know, the exact means used to bring the abdomen to a junction with the leaf on which the aphid stands is unknown, but is probably simple enough when once understood.

An exception to this common practice among braconid parasites is that of the genus *Praon* which attacks the larger aphids. In *Insect Life*, Vol. IV, p. 196, 1891, Dr. Howard calls attention to the fact, often since observed, that the larva of *Praon* constructs a tent-like cocoon beneath the body of its host for a pupation chamber. An opportunity was afforded the writer during the summer of 1916 to watch the entire process of constructing this cocoon, and the details are presented herewith.

July 15, 1916, a parasitized apterous *Macrosiphum pisi* was taken on a leaflet of white clover just as the larval guest within its body had deprived it of the power of motion. The dying aphid, still standing on the leaflet, was placed within a small vial where it would be undisturbed and could be easily observed without interruption.

Scarcely had it been secured in this way when the abdomen of the aphid was rent ventrally by the activity of the imprisoned larva. But the long sprawling legs of the aphid made it clearly impossible to cement the body to the leaf and the problem before the larva was to somehow bridge this gap. It thrust its head at once through the opening and appeared to be carefully investigating the situation. Without entirely leaving the cavity of the aphid's body it swung its flexible head about, not aimlessly as it very soon proved, for in less than five minutes it was busily at work to form its cocoon. Touching the surface of the leaf with the tip of its pointed head, it spun a fine silk thread, attached to the leaf at its lower end, and attempted

to make the upper end fast to the under side of the aphid's body, but failed to make it adhere. Again and again it made the same effort, but for some reason, perhaps because the supply of silk was insufficient, not a single strand spanned the gap. It labored vigorously, rotating an entire circle in its anxiety to succeed. All the while the cauda, and at times half of its body, was hidden from view within the aphid's body, to which it yet clung. For nearly fifteen minutes it twisted and turned, then seemed to grow weary of its fruitless efforts and withdrew entirely inside the body of the aphid.

After a rest of about ten minutes it once more showed its head outside, followed again by nearly the entire body, retaining as before a slight hold by means of the tip of the cauda. This time the spinning was successfully inaugurated and the head went ceaselessly from the leaf to the body above, leaving a ragged and irregular barricade of uneven and perpendicular silk threads arranged in a rude circle. By its serpent-like movements in confined quarters, the larva partly lifted and supported the empty skin of its host on a bend of its writhing body, and as it shifted its position during its slow rotation, the body above rocked like a boat in a gale. Gradually the row of simple upright strands began insensibly to grow more complex, braces stiffened them at the lower end, diagonal threads were occasionally thrown against them and the structure assumed more and more the appearance of a real fabric. The larva worked cleverly, straining the threads at times almost to the breaking point, but never doing any actual damage to its previous work. Never for a moment did it pause in its labor during all the hours it was under observation. It seemed to realize to some extent the meagerness of its resources and the necessity of haste in creating a shelter.

After about two hours of unremitting efforts the structure was near enough completed to justify it in abandoning its former home, so it withdrew its mucilaginous bulk from its birth-place and coiled itself within the mesh of fibers that had been spun. It seemed hardly possible that it could move about in so small a space, but it showed wonderful elasticity and went to work more feverishly than ever, turning slowly around to dis-

tribute the silk evenly on all the uprights. It was impossible not to admire the clumsy skill with which this uncouth creature, for the first and only time in its life, wove its protective screen and overcame the difficulties that hindered the operation.

As more threads were added the fabric became finally so opaque that it was no longer possible to see what was taking place within.

Just at this time another larva began operations beneath its host and the previous observations were easily duplicated.

The adults from both these larvae emerged July 22d, just seven days from the time the larvae began to spin themselves in.

A New *Trichodes* (Cleridae, Coleop.).

By J. WAGENER GREEN, Easton, Pa.

Trichodes bicinctus n. sp.

Moderately robust, elytra slightly broader behind middle. Color black with greenish lustre, base of antennae, palpi, labrum, legs partly, and sides of abdominal segments, pale. Antennal club reddish varying to dark brown. Elytra reddish or fulvous, with antemedian fascia interrupted at suture, a second and slightly wider fascia at apical third, and apex narrowly, black. The apical black spot is concave anteriorly and produced forward on suture and side margin, sometimes uniting with post-median fascia and completely enclosing a rounded pale spot.

Labrum entire or very slightly emarginate. Antennal club broadly triangular. Front concave. Head and thorax finely, rather closely punctured, the latter with slight median smooth space at base. Pubescence fulvous, moderately long on thorax, short on elytra, longer near scutellum. Elytra coarsely punctate, more finely toward base. Apices rounded in both sexes. Body beneath and legs densely clothed with long white pubescence. Penultimate ventral segment of male broadly emarginate, as usual.

Length 11-12 mm.

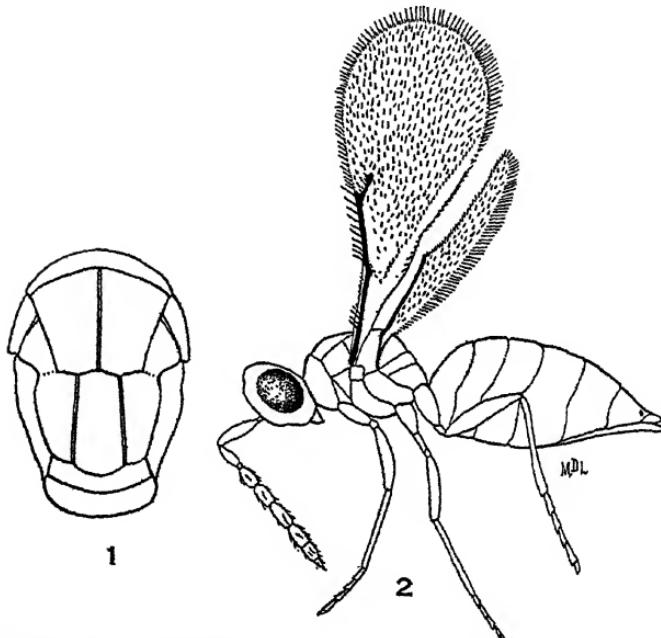
Brewster County, Texas, about twenty miles south of Marfa, July 14 to 25. Two males, a female in the collection of Mr. Wenzel, of Philadelphia. Type in my collection.

Resembles *simulator*, *apivorus* and *bibalteatus* in style of maculation. Readily distinguished from the last by the apical elytral spot, and from the first two by the pale antennal club. Differs from all in the bicolored legs. The femora are more or less pale beneath at base, the anterior and median tibiae slightly paler at apex in the males, almost entirely reddish in the female.

An Egg Parasite of the Sumac Flea-Beetle (Hym., Chalcid.).

By C. R. CROSBY and M. D. LEONARD, Cornell University,
Ithaca, New York.

Mr. Loren B. Smith, of Norfolk, Virginia, has sent us specimens of a hymenopterous parasite reared by him from the eggs of the sumac flea-beetle (*Blepharida rhois* Forster). The species is apparently undescribed.



Tetrastichus ovipransus n. sp.

♀ Length, 1.2 mm. General color bluish black. Head bluish black, brownish in front of ocelli in alcoholic specimens. Thorax bluish black, very finely longitudinally striolate. Antennae yellowish brown, scape noticeably paler. The relative length of the antennal segments may be expressed by the following ratio: scape 6, pedicel 3, funicle segments 4, 4.5, 4.5, club 10. Ring segment small but distinct. The three-segmented club is of the same width as the funicle segments and pointed at the tip. Coxae and femora, except tip, black, remainder of legs pale straw colored. Abdomen dark brownish with a metallic tinge, especially above.

Described from 14 female specimens reared July 20, 1916, and 3 female specimens reared June 24, 1916, from eggs of *Blepharida rhois*, Norfolk, Virginia.

Types in the Cornell University collection. Type No. 76.

Indian Gall Midges (Cecidomyiidae, Dipt.).

By E. P. FELT, Albany, New York.

The writer has been privileged, through the courtesy of Prof. Ramakrishna, of South India, to study two small collections of gall midges reared or obtained from the vicinity of various grasses. In addition to data given in a preceding paper,* we would record the rearing of the rice or paddy gall midge, *Pachydiplosis oryzae* Wood-Mason, from *Panicum stagninum*, and the capture of adults referable with very little question to this species, in light traps. The specimens taken in early October, 1916, were heavy with eggs. *Pseudhormomyia fluvialis* Felt was reared, in addition to food plants previously recorded, from *Panicum punctatum*, and both this species and the closely related *P. cornuta* are here referred to *Dyodiplosis* Rubs. Below we describe one new species and all the stages of a very interesting midge, the adults previously being unknown and tentatively referred to *Oligotrophus* Latr.

Hormomyia ischaemi Kieff.

1910 Kieffer, J. J. Royal Botanic Gardens Kew, Bull., No. 3, p. 71.
(*Oligotrophus*.)

Adults and specimens of the gall of this insect, provisionally referred to *Hormomyia*, were received from Prof. T. V. Ramakrishna, Coimbatore, S. India, under date of November 9, 1916, accompanied by the statement that the insects were reared from a gall on *Ischaemum pilosum* and were very likely identical with the species described from the larva and gall by Dr. Kieffer as *Oligotrophus ischaemi*, which latter is probable though not certain. The larva described by Dr. Kieffer, if this species, is evidently a young stage, since the large size of the midges preclude their developing from such a small full-grown larva.

Gall. Length 11 to 18 cm., diameter 3 to 4 mm. This is a reddish, cylindrical tube pointed at the apex and sheathed at the base by scale-like leaves. The interior is hollow for practically its whole length and emergence is through a small hole near the tip (characters in part from L. A. Boodle, p. 70, *l. c.*).

Egg. Length .2 mm., ovate, cylindrical, whitish and apparently pro-

* Ent. News 28:73-76.

duced in great numbers, since several hundred were found in a vial containing a portion of a gall and one dilapidated female.

Larva. It is probable, as stated above, that the whitish larva described by Dr. Kieffer, *l. c.*, p. 71, is a very young stage or does not belong to this species. A free translation of Dr. Kieffer's description follows:

Larva white, length 2 mm., smooth, the spiny warts very fine and situated on the ventral part of the last two thoracic segments and all of the abdominal segments. The papillae are all simple, save the eight terminal ones, which are provided with very short, scarcely distinct hairs; the pleural and sternal papillae are equally large; the mesial pleural papillae arranged in groups of three; the anterior ventral and posterior papillae small and hardly apparent. Antennal segment rounded, deeply emarginate in the middle, dorsally with sparse granulations on the anterior portion, the posterior part nearly smooth; breastbone yellow, large, sessile, as long as large and with two triangular teeth which have a length twice the width of the base and are separated by a broadly rounded emargination.

Exuvium. ♂. Length 5 mm., moderately stout, yellowish transparent, the thoracic horns slender, slightly curved, nearly cylindrical and with a length about five times the diameter. Antennal cases probably extending to the base of the abdomen and with triangular basal processes with a length about three times the diameter of the base and thickened apically; the wing cases reaching to the tip of the second abdominal segment, and the leg cases to the fifth or sixth abdominal segments; the dorsum of the latter slightly chitinized and with an irregular series of three or four transverse rows of chitinous spines.

♂ Length 3.5 mm. Antennae about as long as the body, thickly haired, yellowish brown; 14 segments, the fifth almost trimodose, the stems with a length $1\frac{1}{4}$ and $1\frac{1}{2}$ times their diameters, respectively; basal enlargement subglobose, with a sparse subbasal whorl of stout setae and a subapical circumfilum, the loops numerous, with a length about half the diameter of the enlargement and forming an almost double row, the latter being true of the middle and distal fili; terminal segment somewhat produced, the basal portion of the stem with a length about twice its diameter, the distal enlargement subcylindric and with a length nearly three times its diameter, and apically a large, fusiform appendage, a rudimentary segment.

Palpi; first segment irregularly ovoid, the second a little longer and stouter, the third more than twice the length of the second and tapering uniformly from a somewhat swollen base. Eyes holoptic.

Mesonotum dark reddish brown. Scutellum concolorous, postscutellum dark reddish brown. Abdomen dark yellowish brown, somewhat variable, the genitalia yellowish; the terminal clasp segment fuscous apically.

Wings subhyaline, brownish, shorter than the body, the third vein uniting with the margin well beyond the apex, the fifth vein joining the posterior margin at the distal fourth, its branch beyond the basal half; halteres yellowish basally, brownish yellow apically.

Coxae reddish brown; legs mostly yellowish brown, the tarsi somewhat darker.

Genitalia; basal clasp segment short, broad, swollen basally; terminal clasp segment moderately long, nearly straight; dorsal plate short, broad, deeply and narrowly emarginate, the lobes narrowly rounded; ventral plate a little longer, broad, broadly rounded apically.

♀ Length 5 mm. Antennae probably three-fourths the length of the body, sparsely haired, dark brown; 14 segments, the fifth with a stem one-fourth the length of the subcylindric basal enlargement, which latter has a length about four times its diameter and low, looped circumfili near the basal third and subapically.

Palpi; first segment irregular, the second a little longer, subquadrate, the third more than twice the length of the second, slender and nearly uniform in diameter.

Mesonotum dark brownish black, the submedian lines sparsely haired. Scutellum and postscutellum concolorous, the former with a few golden hairs apically. Abdomen shining dark brownish black, sparsely clothed with short hairs.

Wings slightly fuscous and only about two-thirds the length of the abdomen, the third vein uniting with the margin just beyond the apex of the wing, the fifth with the indistinct anterior branch joining the posterior margin at the distal fourth and the posterior branch beyond the basal half; halteres yellowish orange basally, fuscous subapically.

Coxae and legs a nearly uniform dark brown; claws moderately stout, strongly curved subapically, simple; pulvilli nearly as long as the claws.

Ovipositor short, the lobes irregularly oval, with a length about one-half greater than the width and rather thickly setose.

Type Cecid. a 2781.

Dyodiplosis andropogonis n. sp.

The species described below was received from Prof. T. V. Ramakrishna, Government Entomologist, Agricultural College and Research Institute, Coimbatore, South India, under date of November 9, 1916, accompanied by a statement to the effect that the midges were reared from galls in a common perennial grass, *Andropogon annulatus*, at Adoni, Bellary District, September 23, 1916, and labeled Y. R. Rao Coll. These insects are similar to though quite distinct from *Pseudhormomyia flu-*

vialis Felt and *P. cornea* Felt, both received earlier from the same correspondent. These last two species are congeneric with the one to be characterized and now referred to the genus *Dyodiplosis*.

♂ Length 2 mm. Antennae one-half longer than the body, thickly haired, yellowish brown; 14 segments, the stems with a length one and one-fourth and two and one-half times their diameters, respectively, the distal enlargement with a length one and three-fourths greater than its diameter and only slightly constricted near the basal third as compared with *D. fluvialis*. The circumfili are fine and moderately long; terminal segment produced, the basal portion of the stem with a length three times its diameter, the distal enlargement cylindric, with a length fully three times its diameter and apically a moderately stout, rather long, conical process.

Palpi; first segment short, irregular, with a length about one-half greater than its diameter, the second a little longer and broader, the third about as long as the two preceding, more slender.

Mesonotum purplish brown, the submedian lines and posterior median areas yellowish. Scutellum and postscutellum mostly pale yellowish. Abdomen sparsely haired, a variable dark brown basally, yellowish brown apically.

Wings hyaline; halteres yellowish basally, light brown apically.

Legs mostly a pale straw.

Genitalia; basal clasp segment moderately long, stout; terminal clasp segment distinctly swollen basally, tapering; dorsal plate deeply and triangularly emarginate, the divergent lobes narrowly rounded; ventral plate long, broad, subtruncate apically, the posterior border slightly and roundly emarginate; style a little longer than the ventral plate.

♀ Length 3 mm. Antennae nearly as long as the body, sparsely haired, dark reddish brown; 14 segments, the fifth with a stem one-third the length of the cylindric basal enlargement, which latter has a length about four times its diameter and sparse whorls of stout setae subbasally and apically; terminal segment hardly produced, the enlargement with a length three and one-half times its diameter and apically a rather broad subconical process.

Abdomen sparsely haired, mostly dark reddish brown, the seventh segment and the lobes of the ovipositor yellowish brown; halteres yellowish basally, reddish brown apically; claws long, rather slender strongly curved apically, the pulvilli a little shorter than the claws.

Ovipositor short, tapering, the lobes with a length over twice the width and tapering irregularly to a narrowly rounded, setose apex. Otherwise as in the male.

Type—Cecid. a 2782.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., OCTOBER, 1917.

The Lack of Entomologists.

The war has resulted in a great demand for men and women trained in many lines of work. Many activities which the times have brought into being will doubtless meet with such approval as to insure their continuance after the fighting has ceased. As in other fields of science, the present supply of entomologists does not meet the demand.

Mr. V. I. Safro, of Louisville, Kentucky, as quoted in Report No. 3 of the Emergency Entomological Service (U. S. Dept. Agric.), calls attention

to the difficulty of obtaining adequately trained men for emergency entomological work and suggests the advisability of giving them special training. . . . Many of the standard recommendations apply to conditions in gardens or in small cultures and do not necessarily apply to the conditions in various regions where very extensive cultures of onions and similar crops are undertaken. . . . Growers want to know not only how to combat certain insect pests but [also] how certain operations can be economically combined with other operations. To meet this important situation, extension entomologists should be . . . thoroughly acquainted with the control of plant diseases as well as insect pests and the mechanical equipment necessary for effective work. Too often our economic entomologists ignore the fact that their recommendations cannot possibly be conducive to the best results unless they know and explain how growers can combine fungicides with insecticides, thereby reducing one of the main items of expense, the labor. Many growers will not spray at all for certain insects unless they know that the insect spray can be combined with Bordeaux or some other fungicide.

Again Dr. T. J. Headlee, State Entomologist of New Jersey, says (in Report No. 4 of the same series) of the farm demonstration service in that State:

The greatest weakness of the whole service is the lack of trained men to do sufficiently thorough entomological scouting. This lack is a real handicap because outbreaks of considerable proportions are sometimes not thoroughly appreciated until they are about ready to occur and this means that a good many growers will be unable to get materials and machinery in time to do effective work.

There would therefore seem to be great opportunities for useful service to the nation in applied entomology and encouragement to those who may be thinking of an entomological career.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS
OF THE GLOBE. -

Sex Attraction Overcome by Light Stimulation (Lepid., Col.).

Those who are familiar with Fabre's delightful stories in "The Life of the Caterpillar" will remember that he was greatly exercised in endeavoring to account for the facility with which the male moth will recognize from a great distance the existence of his mate. The usual theory of the operation of the sense of smell was to him utterly unsatisfactory.

Many years ago I was astonished at the great number of male Cecropia that came to a cage in which I had females confined. By referring to my statement in the ENTOMOLOGICAL NEWS of May, 1895, I find that in addition to the number destroyed by robins and cats, the wings being the principal part of the debris left, I counted three hundred and forty-two specimens taken in four nights. I am reminded of this old story by a recent experience.

For many years *Telca polyphemus* has been in this immediate neighborhood an exceedingly rare insect. Last autumn I had given me a few Polyphemus cocoons gathered from trees some ten or fifteen miles distant. When recently the moths began to emerge, I left two females in a cage on my back porch for several nights, and while the number of arriving and inquisitive males (eighteen in all) was not large, as compared with my previous Cecropia experience, there was one curious feature in connection with their advent, on which I should be glad to hear Fabre philosophize if he were still with us. I have every reason to believe that the male moths came to my lure from a considerable distance. When they arrived, or possibly soon afterward, they discovered, only five or six feet from the cage in which were confined the females they were doubtless seeking, an electric light illuminating my insect trap which, except on brilliant moonlight nights, attracts all sorts of nocturnal hexapods. Their attention seems to have been thus distracted from their previous quest and instead of going to the cage, or remaining there, if possibly they reached it, they all without exception made their way into the trap from which they could not escape. The brilliant light seems to have had so strong an influence upon them as to have counteracted their previous inclination rendering it powerless. It was also very noticeable that the *wild* moths, with but a single exception, were smaller than those hatched in captivity, a circumstance possibly indicating a less abundant or a less invigorating food-plant on which the larvae had been feeding.

My insect trap disposes of a great many *Lachnosterna*. Within the

last few nights (mid-June, 1917) it has taken one hundred and eighty-one *futilis*, but there have been caught only three *rufosa*, while *fusca*, usually most abundant, has not been represented at all.—O. S. WESTCOTT, Oak Park, Illinois.

Emergency Entomological Service.

Numbers 3, 4 and 5 of the reports of the Emergency Entomological Service, United States Dept. of Agriculture, "Reporting cooperation between Federal, State and Station Entomologists and other Agencies," have appeared since the preceding issue of the News. They are dated July 1, August 1, and September 1, and consist of 21, 28 and 25 mimeographed pages, respectively.

Among their more important contents are notes of new legislation in Illinois whereby the State Dept. of Agriculture has authority to compel owners, or other occupiers, of property infested by insect pests or plant diseases to take measures to arrest or prevent the same under penalties (upon conviction) of fines of \$10 to \$100 for each and every offense; the establishment of an Insect Pest Survey and Information Service by Dr. E. P. Felt, under the New York Food Supply Commission (a description of the workings of this Survey by Prof. C. R. Crosby is given in No. 4); a similar survey in Ohio under Prof. H. A. Gossard; the use of farm demonstrators in practically every county in New Jersey, reported by Dr. T. J. Headlee, and in Tennessee under Mr. G. M. Bentley; a systematic educational campaign in Mississippi leading up to "Spray Your Orchard Week," December 9-15, 1917, to be so designed by proclamation of the Governor.

The Food Production Act, approved by President Wilson August 10, 1917, appropriates \$441,000 "for the prevention, control and eradication of insects and plant diseases injurious to agriculture, and the conservation and utilization of plant products." Of this sum \$145,775 has been allotted to the Bureau of Entomology. A statement is given in No. 5 of the way in which it is proposed to expend this sum. "It is contemplated to inaugurate the present fall an extensive campaign against the Hessian fly and to undertake work on a large scale in the control of insects injurious to stored grains, peas, beans and stored products generally. During the winter, work in dormant tree spraying for scale insects, fumigation of citrus trees and similar activities will be actively pushed. . . . Never before in the history of economic entomology in this country have there been funds to carry, on so large a scale directly to the farmer, fruit grower, stock man and others, practical instruction in the treatment of insect pests."

Reports on insect injuries in 15 States are given in No. 3, in 25 States in No. 4, and in 21 States in No. 5. Among the insects whose depredations have been more serious are:

Grasshoppers in California, western Montana (the Rocky Mountain migratory locust), Nebraska, North and South Dakota, Iowa, southern Indiana, Michigan, the District of Columbia, New York, Vermont and Connecticut;

Hessian fly in eastern Kansas;

chinch bug in Oklahoma and southwestern Illinois;

wireworms (*Melanotus* larvae) in Montana, Idaho and eastern Nebraska;

aphids on barley in southern Arizona, on melons in Nebraska and the Gulf region from Florida to Texas, on conifers in Colorado, on potatoes and tomatoes in Kentucky, New Jersey, Ohio, Pennsylvania, Virginia and Massachusetts, on cabbage in Nebraska, Missouri, New Jersey and Iowa and aphids generally in gardens in cities of Indiana planted on ground which has not been in cultivation for a number of years;

plum curculio in northeastern Ohio and New Jersey (but not in West Virginia or Georgia);

the sheep bot in Mississippi;

the mole-cricket in coastal South Carolina;

red spider in North Carolina on cotton, in Texas on beans and alfalfa;

cut worms in Indiana;

southern corn root-worm beetle (*Diabrotica z-punctata*) in western Illinois;

lesser corn stalk borer (*Elasmopalpus lignosellus*) in the Gulf States, particularly Mississippi;

boll weevil in Florida, southern and central Texas and Arkansas;

sod web-worms (*Crambus* species) in northern Illinois;

fall web worms (*Hyphantria* spp.) in Louisiana, Mississippi and New York;

white-marked tussock moth in eastern Nebraska, New Jersey, Ohio, Indiana, Connecticut and many other States; other foliage insects are also noted;

seed corn maggot (*Phorbia fuscicaps*) in New York;

Colorado potato beetle in Virginia, Wisconsin, Arizona and Missouri, although reported as not very destructive elsewhere.

"The area infested by the alfalfa weevil is producing the only good first crop of alfalfa seen there in five years."

The "surplus of arsenate of lead and Paris green in the country is very low;" arsenate of lime is being substituted for arsenate of lead in Nova Scotia, arsenite of zinc for Paris green in Montana, at a large saving.

Decrease in the natural insect enemies of coniferous bark beetles

(*Dendroctonus*) in the Pike's Peak region of Colorado is especially noticeable. On the other hand, parasitic flies (*Sarcophaga*) attacking grasshoppers are increasing in Montana.

"The destructive result of the hot weather in Southern California [June 14-17: 115-120 deg. F.] against citrus pests has been about equivalent to a season's insecticide treatment." "The unusual amount of rain in the spring" in northeastern Louisiana "gave rise to an unusually high density of malaria mosquitoes early in the season with a consequent early appearance of active cases of malaria." This was followed by "lack of rain and high temperatures operating on both the larvae in the breeding places of these mosquitoes and the activity of the adults. The reduction in the active cases of malaria is already apparent." An "unprecedented number of fleas" (4 species) reported from the vicinity of Dallas, Texas, is believed to have been "correlated with the rather uniform distribution of rainfall during the spring months and probably a high humidity."

One of the largest flights of may-beetles (*Lachnostenus*) experienced in several years covered the entire State of New Jersey.

Copies of all entomological literature, as letters, special bulletins, circulars, press-notices, posters, etc., issued by State and Station entomologists, State Councils of Defense, Boards of Health and other bodies in connection with the present war emergency, are requested by the Bureau of Entomology at Washington, in order that as complete a file as possible may be preserved for reference use in its library.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted, but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded.

The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new species are all grouped at the end of each Order of which they treat. Unless mentioned in the title, the number of the new species occurring north of Mexico is given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

- 3—The American Naturalist. 4—The Canadian Entomologist.
5—*Psyche*. 8—The Entomologist's Monthly Magazine, London.
11—Annals and Magazine of Natural History, London. 12—

Comptes Rendus, L'Academie des Sciences, Paris. 50—Proceedings, U. S. National Museum. 51—Novitates Zoologicae, Tring, England. 87—Bulletin, Societe Entomologique de France, Paris. 121—Archives des Sciences Physiques et Naturelles, Geneva. 143—Ohio Journal of Science, Columbus, Ohio. 161—Proceedings, Biological Society of Washington. 163—American Journal of Science, New Haven, Conn. 179—Journal of Economic Entomology. 180—Annals, Entomological Society of America. 184—Journal of Experimental Zoology, Philadelphia. 198—Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. 200—Bulletin Scientifique de la France et de la Belgique, Paris. 220—New Jersey Agricultural Experiment Station, New Brunswick. 242—Transactions, Royal Society of Canada (3d Series), Ottawa. 257—Bulletin, Public Museum of the City of Milwaukee. 313—Bulletin of Entomological Research, London. 335—Smithsonian Miscellaneous Collections. 350—Bulletin from the Laboratory of Natural History of the State University of Iowa, Iowa City. 394—Parasitology, Cambridge, England. 408—Dominion of Canada Department of Agriculture Experimental Farms, Division of Entomology, Ottawa. 411—Bulletin, The Brooklyn Entomological Society. 417—University Studies, Lincoln, Nebraska. 447—Journal of Agricultural Research, Washington. 454—North Carolina Department of Agriculture, Raleigh. 478—Miscellaneous Publications, Museum of Zoology, University of Michigan. 503—Verhandlungen der Naturforschenden Gesellschaft in Basel. 507—Occasional Papers, Museum of Zoology, University of Michigan. 513—South African Journal of Sciences, Cape Town. 515—Proceedings, American Philosophical Society, Philadelphia. 524—Technical Bulletins, Entomology, University of California, Berkeley. 533—Memoirs, American Entomological Society. 538—Lorquinia, Los Angeles. 549—Revue Zoologique Russe, Moscow.

GENERAL SUBJECT.—Allard, H. A.—Synchronism and synchronic rhythm in the behavior of certain creatures, 3, ii, 438-46. Baumberger, J. P.—Hibernation: a periodical phenomenon, 180, x, 179-86. Bethune, C. J. S.—Bibliography of Canadian entomology for the year 1915, 242, x, Sec. 4, 169-87. Carson, H. L.—The trial of animals and insects. A little known chapter of mediaeval jurisprudence, 515, lvi, 410-15. Cockerell, T. D. A.—Some fossil insects from Florissant, Colorado, 50, liii, 389-392. Coleman, Geo. A.—The development of the motion picture and its place in educational work, 179, x, 371-3. Crampton, G. C.—The nature of the vera-cervix or neck region in insects, 180, x, 187-97. McIndoo, N. E.—Recognition among insects, 335, lxviii, No. 2, 78 pp. Mally, C. W.—On the selection and breeding of desirable strains of beneficial

insects, 513, xiii, 191-5. **Moore, W.**—Toxicity of various benzine derivatives to insects, 447, ix, 371-81. **Vorhies, C. T.**—Notes on the fauna of Great Salt Lake, 3, li, 495-9. **Wilson, T.**—Obituary note by C. G. Hewitt, 4, 1917, 289-90. **Zavarzin, A.**—Quelques donnees sur la structure du systeme nerveux intestinal des insectes, 549, i, 176-80.

PHYSIOLOGY AND EMBRYOLOGY. **Patterson & Porter**—Studies on the biology of *Paracopidosomopsis*. II. Spermatogenesis of males reared from unfertilized eggs, 198, xxxiii, 38-48. **Shaffer, E. L.**—Mitochondria and other Cytoplasmic structures in the spermatogenesis of *Passalus cornutus*, 198, xxxii, 407-34.

MEDICAL. **Herms, W. B.**—A state wide malaria-mosquito survey of California, 179, x, 359-70. **Zetek, J.**—The ecology of bubonic plague, 180, x, 198-206.

ARACHNIDA, ETC. **Hirst, S.**—On the occurrence of a pseudo-parasitic mite (*Cheletiella parasitivorax*) on the domestic cat, 11, xx, 132-3. **Patten, B. M.**—Reactions of the whip-tail scorpion to light, 184, xxiii, 251-75.

Emerton, J. H.—New spiders from Canada and the adjoining States [17 new], 4, 1917, 261-72. **Ewing, H. E.**—A synopsis of the genera of beetle mites with special reference to the North American fauna [12 n. gen.], 180, x, 117-132.

NEUROPTERA, ETC. **Campion, H.**—On Fabricius's types of Odonata in the British Museum (N. H.), 11, xix, 441-50. **Combs, A. F.**—Notes on a collection of Odonata from Schoolcraft County, Michigan, 507, No. 41, 8 pp. **Williamson, E. B.**—An annotated list of the Odonata of Indiana, 478, No. 2, 12 pp.

Currie, B. P.—*Gomphus parvidens*, a n. species of dragonfly from Maryland, 50, liii, 223-6. **Kennedy, C. H.**—A new sp. of *Somatochlora* (Odonata), with notes on the Cingulata-group, 4, 1917, 229-36. **McGregor, E. A.**—Six new sps. of Mallophaga from North American mammals, 180, x, 167-78.

ORTHOPTERA. **Hebard, M.**—The Blattidae of North America, north of Mexico, 533, 2, 284 pp.

HEMIPTERA. **Baker & Davidson**—A further contribution to the study of *Erisoma pyricola*, the woolly pear aphid, 447, x, 65-74. **Davidson, W. M.**—The reddish-brown plum aphid (*Rhopalosiphum nymphaei*), 179, x, 350-3. **Distant, W. L.**—On some Rhynchota of economic importance from Colombia, 313, vii, 381-2. **Ferris, G. F.**—Methods for the study of mealy-bugs, 179, x, 321-5. **Gibson, E. H.**—Key to the species of *Leptoglossus* occurring north of Mexico,

5, xxiv, 69-73. A key to the species of Dictyophora, 411, xii, 69-71. Gillette & Bragg—The migratory habits of *Myzus ribis*, 179, x, 338-40. Hollinger, A. H.—A new sp. of *Phenacoccus*, 4, 1917, 281-4. Hungerford, H. B.—The life history of *Mesovelia mulsanti*, 5, xxiv, 73-84. Knight, H. H.—Records of European Miridae occurring in No. America, 4, 1917, 248-52. Newstead, R.—Observations on scale-insects (Coccidae), III, 313, vii, 343-80. Quayle, H. J.—Some comparisons of *Coccus citricola* and *C. hesperidum*, 179, x, 373-6. Stoner, D.—The Pentatomidea of the Lake Okoboji region (Iowa), 350, vii, 39-47.

Drake, C. J.—The No. American species of *Monanthia* [2 new], 411, xii, 49-52. Essig, E. O.—Aphididae of California....chiefly from the campus of the University [4 new], 524, Ent. i, 301-346. Florence, L.—The pacific coast species of *Xylococcus* [1 new], 180, x, 147-66. Gillette, C. P.—Some Colorado species of the genus *Lachnus* [3 new], 180, x, 133-46. McAtee, W. L.—Key to the nearctic species of *Leptophysa* and *Leptostyla* [3 new], 411, xii, 55-64. Osborn & Drake—Notes on American Tingidae with descriptions of [10] new species, 143, xvii, 295-307. Shinji, G. O.—Notes on aphids [1 new], 5, xxiv, 84-6.

LEPIDOPTERA. Busck, A.—The pink boll worm, *Pectinophora gossypiella*, 447, ix, 343-70. Cholodkovsky, N.—Sur les glandes odorifères de l'appareil genital feminin des L., 549, i, 215-16. Colthrup, C. W.—Resting attitudes of moths and some notes on their habits (cont.). (Wild Life, London, ix, 179.). Courvoisier, L. G.—Ueber mannchenschuppen bei Lycaeniden, 503, xxvii, 11-48. Hampson, G. F.—A classification of the Pyralidae, subfamily Galerianae, 51, xxiv, 17-58. Joicey & Kaye—New races and aberrations of *Heliconius*, 11, xx, 87-94. Jordan, K.—Two new American moths, 51, xxiv, 56-60. Marsh, H. O.—Life history of *Plutella maculipennis*, the diamond-back moth, 447, x, 1-9. Pictet, A.—Sur l'origine de quelques races géographiques de L., 121, xlvi, 501-6. Prout, L. B.—New Geometridae in the Joicey collection, 11, xx, 108-28. Rothschild, L.—On some apparently new Notodontidae, 51, xxiv, 231-64. Tams, W. H. T.—*Euplexia lucipara*, as represented in the British Isles and No. America, 8, 1917, 157-9. Tucker, E. S.—Louisiana records of the bind-weed prominent (*Schizura ipomeae*), 4, 1917, 280-1. Wolley-Dod, F. H.—Collection of Macro-Lepidoptera, owned by F. H. Wolley-Dod, Midnapore, Alta, Canada, 4, 1917, 240-8.

DIPTERA. Atkin & Bacot—The relation between the hatching of the eggs and the development of the larvae of *Stegomyia fasciata*, and the presence of bacteria and yeasts, 394, ix, 482-536. Baum-

berger, J. P.—Solid media for rearing *Drosophila*, 3, ii, 447-8.
Ejikoff, I.—Influence de l'inanition sur la métamorphose des mouches à ver, 549, ii, 119-21. Keilin, D.—Sur quelques cas d'anomalie chez les D., 87, 1917, 193-6. Recherches sur les Anthomyides à larves carnivores, 394, ix, 326-450. Kirk, H. B.—Notes on fly-control in military camps, 16 pp. (New Zealand Defence Dept., Wellington.). Kislink, M.—Some winter observations of muscid flies, 143, xvii, 284-94. Richardson, C. H.—The domestic flies of New Jersey, 220, Bul. No. 307. Scott, H.—Notes on Nycteribiidae, with descriptions of two new genera, 394, ix, 593-610. Stiles, C. W.—Notice to the zoological profession of a possible suspension of the international rules of zoological nomenclature in case of *Musca* and *Calliphora*, 11, xix, 484.

Banks, N.—Synopsis of the genus *Dasyllis* [6 n. sps.], 411, xii, 52-5. Jones, C. R.—New sps. of Colorado Syrphidae [18 newl], 180, x, 219-31. Knab, F.—On some No. American species of *Microdon*, 161, xxx, 133-144. Malloch, J. R.—A new No. American sp. of the genus *Tetramerinx*; The anthomyiid genus *Phyllogaster* [1 newl], 4, 1917, 225-26; 227-8.

COLEOPTERA. Bordas, L.—Ponte du Rhynchite coupe-hourgon (*Rhynchites conicus*) et anatomie, 12, 1917, 70-3. Burke, H. E.—Notes on some western Buprestidae, 179, x, 325-32. Champion, G. C.—Notes on Tropical American Lagriidae, with descriptions of new species (cont.), 8, 1917, 132. Howard, L. O.—An interesting manuscript, 5, xxiv, 87-8. Metcalf, Z. P.—Biological investigations of *Sphenophorus callosus*, 454, Exp. Sta. Tech. Bul., 13, 123 pp. Weise, J.—Coleopterorum catalogus, Pars 68: Chrysomelidae; 12. Chrysomelinae, 253 pp.

Blatchley, W. S.—On some new or noteworthy C. from the west coast of Florida, II. [4 newl], 4, 1917, 236-40 (cont.). Fisher, W. S.—A new sp. of *Agrilus* from California, 4, 1917, 287-9. Swaine, J. M.—Canadian bark-beetles. Pt. 1. Descriptions of new species [2 n. g., 39 n. sps.], 408, Bul. 14, 32 pp. Wickham, H. F.—Some fossil beetles from the Sangamon peat [9 newl], 163, xliv, 137-45.

HYMENOPTERA. Bordas, L.—Anatomie des glandes venimeuses des Pimplinae, 87, 1917, 197-8. Cholodkovsky, N.—Sur les papilles eversibles des larves tentredinides du genre *Nematus*, 549, i, 216-19. Cockerell, T. D. A.—Some neotropical Megachilid bees, 4, 1917, 252-4. Descriptions and records of bees—LXXV, 11, xix, 473-81. Grinnell, F., Jr.—A rare and interesting wasp, 538, xi, 86. Mickel, C. E.—Notes on Nebraska Bembicinae, 4, 1917, 285-7. Patterson, J. T.—Studies on the biology of *Paracopidosomopsis*. III. Maturation and fertilization, 198, xxxiii, 57-66. Rabaud, E.—

Sur les hymenopteres parasites des oothecques d'Orthopteres, 87, 1917, 178. Rohwer & Fagan—The type-species of the genera of the Cynipoidea, or the gall wasps and parasitic cynipids, 50, liii, 357-80. Roubaud, E.—Observations biologiques sur Nasonia brevicornis, chalcidide parasite des pupes de muscides, 200 (7), 1, 425-39. Smith, E. J.—Cleaning bumble-bees, 4, 1917, 291. Smith, H. S.—The habit of leaf-oviposition among the parasitic H., 5, xxiv, 63-8.

Girault, A. A.—The No. Am. species of Pachyneuron with three n. sps.; New miscellaneous chalcid-flies from No. Am. [15 new]; A new sp. of the gen. Mymar from the woods of Maryland, with an important descriptive note. A metallic sp. of Cirrospilopsis from Maryland. A new sp. of Closterocerus from California. A new gen. or subgen. of Pachyneurine chalcid-flies, 5, xxiv, 88-90; 99-102. Graenicher, S.—Bees of northwestern Wisconsin [7 new], 257, 1, 221-49. Rohwer, S. A.—Descriptions of 31 n. species of H., 50, liii, 151-76. Swenk, M. H.—Studies of No. American bees. III. Families Nomadidae and Stelididae [13 new], 417, xv, 155-93.

Doings of Societies.

Entomological Section, The Academy of Natural Sciences, Philadelphia.

Meeting of March 22, 1917. Twelve persons present. Vice-director R. C. Williams, Jr., presiding.

Lepidoptera.—Dr. Skinner reported on, and exhibited a collection of moths collected and presented by Mr. Morgan Hebard, which contained over 1800 specimens. Especial attention was called to the excellent condition of the material. The collection was made in the summer of 1916, by the aid of a 300-watt electric light, on the porch of a cottage at Hot Springs, Virginia. A vote of thanks was given Mr. Hebard for his generous donation, and Dr. Skinner was complimented on the perfect preparation of the specimens.

Orthoptera.—Mr. Rehn exhibited a series of *Paratettix* presented to the Academy by Dr. Nabours, illustrating his studies on inheritance of color patterns in the genus. The true breeding forms and simple and multiple hybrids were represented in the splendidly preserved material. Mr. Hebard made some remarks on his collecting experiences in Royal Palm Key, Florida. He exhibited some Orthoptera collected and showed some photographs of the habitat of some of the species. He called attention to the difficulty in collecting the walking stick *Aplopus mayeri* on account of its close resemblance to the branches and twigs of the bush on which it feeds. It was only by looking for them at night, by flash light, that the adults could be located.—E. T. CRESSON, JR., *Recorder*.

Feldman Collecting Social.

Meeting of March 21, 1917, at the home of H. W. Wenzel, 5614 Stewart St., Philadelphia. Seven members were present; President H. A. Wenzel in the chair.

Lepidoptera.—Mr. Daecke exhibited *Scopelosoma sidus* Gn. collected by Prof. Sanders in a railroad train at Philadelphia II-26-17.

Coleoptera.—Mr. H. W. Wenzel exhibited the form of *Cicindela hirticollis* Say so common on the New Jersey shore and the extremely large form from Narragansett Pier, June to Sept., 1916. Also the immaculate form *nigrita* Davis, now known as *rhodensis* Calder, from same place Aug. 21, 1916; *Euphoria subtomentosa* Mann. from Nogales, Sta. Cruz County, Arizona, VIII-12-16, F. W. Nunenmacher collector; *Gymnopyge hopliaformis* Linell, Palm Springs, California, III-29-16, C. L. Fox collector, and *Oncerus floralis* LeC., Palm Springs IV-1-16.

Adjourned to the annex.—GEO. M. GREENE, *Secretary*.

American Entomological Society.

Meeting of April 26, 1917, in the hall of the Academy of Natural Sciences of Philadelphia, Dr. Henry Skinner, President, in the chair. Eleven members and associates of the Entomological section of the Academy present.

The Secretary read a letter from Dr. L. O. Howard, of the U. S. Department of Agriculture, Washington, D. C., requesting entomologists to report the discovery or presence of insect pests.

Odonata.—Mr. Laurent exhibited specimens of *Tramea carolina* and *Epiæschna heros*, collected in Gulf Hammock, Florida, during last March. The speaker stated that *carolina* was exceedingly abundant on bright, sunny days, but disappeared towards twilight, when the species would be replaced by large numbers of *heros*. On cloudy days hardly a specimen of *carolina* was to be seen, but *heros* would be flying everywhere.

The meeting then adjourned to listen to an interesting talk by Dr. Skinner on the early entomologists illustrated by portraits thrown on the screen.—R. C. WILLIAMS, JR., *Recording Secretary*.

Butterfly Club Organized in Los Angeles.

On the evening of May 30th, Dr. John Comstock, Curator of the Division of Entomology, Southwest Museum, Los Angeles, California, addressed an audience on the subject of "Butterfly Collecting."

The talk was illustrated by Paget & Autochrome slides from the collection of Dr. Dain L. Tasker. It was in the nature of a popular address, and was given as a part of the extension program of the museum.

Following the lecture, an association was formed as a department of the museum, for the furtherance of entomological interests in the southwest. The purpose of this organization is to popularize the study of the Lepidoptera, and to make the work of the specialists in this line more accessible to the laity. It is felt that in this manner converts may be made to the ranks of the scientific Lepidopterists, such as could not be brought about by an organization of technically trained specialists.

OBITUARY NOTES.

A notice of the life of the Rev. OCTAVIUS PICKARD-CAMBRIDGE, who died at Bloxworth, Dorset, England, March 9, 1917, is given in the *Entomologist's Monthly Magazine* (London) for May, 1917. He was born in the same locality November 3, 1828, and was Rector of Bloxworth from 1868 to his death. He graduated from the University of Durham in 1858 and had studied law in London previous to entering the ministry. His publications dealt mainly with the Arachnida: on the Spiders of the Second Yarkand Mission, of the Challenger expedition, of Dorset (but including those of all Britain), of a large part of those described in the *Biologia Centrali-Americana*; monographs of the British Phalangida and Chernetidae, etc. He possessed an extensive collection of British Lepidoptera, especially the micros, largely gathered by himself. He must not be confused with his nephew, Frederick Octavius Pickard-Cambridge (1861-1905), who also wrote extensively on Arachnida and was a collaborator on the *Biologia*.

Mrs. HELEN GRIER LECONTE, widow of Dr. John L. LeConte (1825-1883), the noted entomologist, died in Philadelphia, September 3, 1917, in her seventy-fifth year, at the home of her son, Dr. Robert G. LeConte, a trustee of the University of Pennsylvania and a member of the Council of the Academy of Natural Sciences.

Corrections.

Page 335, this volume, line 5, for "1911" read "1917."

The numbers of Plates XXII and XXIII should be transposed.





THE CHINESE GALL.—BAKER.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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On the Chinese Gall (Aphididae—Hom.).

By A. C. BAKER, Bureau of Entomology, Washington, D. C.
(Plate XXVI.)

The galls produced by an aphid on *Rhus semialata* have for many centuries been an important article of commerce in China. They are employed in dyeing and tanning, as well as in native medicines, and the export of these galls in recent years has been valued at about one million dollars per annum. The use of these and similar galls would seem of special interest at the present time to workers in this country, since gall-nuts are one of the principal ingredients of the so-called secret method of the London seal dyers. Although the galls are well known in commerce, publications on the insect producing them are widely scattered and difficult of access. It seems wise, therefore, to bring the literature together and to compare the insect with its well known relatives in this country.

The first publication on the species seen by the writer is that of Li-Shih-chén (1590?). The Pên tsao by this author was completed in 1578, after about twenty-five years of labor. A copy said to be dated 1590 is in Berlin and only later copies are available in this country. The materials referred to by Li Shih-chén were usually very well known at his time and his work was compiled, with additions, from some thirty-nine earlier publications, some of them very ancient works, so it is quite likely that these aphid galls were known long before his time.

There are very many references in Chinese literature, particularly medical, which are not in the bibliography given with this article. These will be found recorded in the Tu Shu Chi Ch'êng (1728) where a rather extended article on the species is given.

The Pên tsao mentioned previously gives a figure of the galls (reproduced on Plate XXVI, Fig. 1), and after describing the plant speaks of the nut and says: "On the leaf is an insect which produces the *Wu-p'ei-tzee* which is collected in the eighth moon."

It is perhaps worthy of note that in the Pên tsao the *Wu-p'ei-tzee* is included under the insects produced from eggs. The insects form the first division of animals and there appear to be of these insects four groups, the frog being included in the last one with aquatic insects. The general life history of these gall aphids seems to have been fairly known, but this can hardly be said of all forms of life, for the insects are followed by a group composed of dragons.

It is indicated by Pereira (1844) that the gallnut is used in making soup and as a protection against the peculiar vapors of the hill country. "Gallnut" is the term by which these galls are known commercially, but it does not seem from their composition that they would make good soup. In speaking of the nut of the tree Li-Shih-chén says: "On the skin there is a fine coating of salt" and no doubt this refers to the pollen which may have been used as a soup flavoring. That the fruit may have been used is quite possible, since the fruit of the same tree is eaten by the Nepaulese and Lepchas.

The first European reference appears to be that of Cleyer (1682), who describes the material from the medical point of view under the name *U poi çù*.

Another early and more complete European account is that given by Geoffroy (1724). He refers to the galls under the Chinese name *Oupeytze* and says that commercially they are known as "Indian ears." He had a notion that the galls formed by aphids on elms might be the same as the Chinese galls.

A rather extended account is given by Du Halde (1735), which is referred to by Brande (1817). He says that the natives of China pick the galls before frost and expose them to hot water or steam in order to kill the insects. A 1770 English translation of this work is referred to by Pereira (1844). The Paris edition (1735) is not available to the writer, but he has seen a Hague edition (1736) and the name is here spelled in the French *Ou-poey-tse*.

In Japan Ono (1802) described these galls under the name of *Mimibushi* or *Fushi*. He says they are hollow and contain large numbers of minute insects. The powder of the dried galls he states is used by Japanese women to blacken their teeth. There may be earlier Japanese references, perhaps in Japanese editions of Chinese Pêñ tsaos, but it has seemed a needless task to search the literature for these.

The first examination into the composition of the gall seems to have been made by Brande (1817). The material he used was marked *Oong poey* and was used in dyeing black. He made extracts of the galls and obtained twenty-five parts of insoluble woody matter. He suggests they could be used for making writing ink.

In 1844 Guibourt brought these galls again to the attention of Europe, but considering them unknown, described them under the name of the *cauliflower gall*. He had a dried specimen in his own shop and fragments from a Mr. Ledanois. Ledanois analyzed the material and obtained 60 per cent. of tannic acid. This appears to be the first real analysis. At the same time Pereira (1844) gave an excellent account under the name of *Woo-pei-tsze* with quotations from the Pêñ tsao and a

reference to a translation of Du Halde. He was the first to have a good supply of the galls and his came from Canton.

A few years later an article appeared (Bell, 1848), describing the insect found within the galls as a new species under the name of *Aphis chinensis*. This name has by some writers been credited to Doubleday, but since the article was unsigned Jacob Bell must be considered the author.

Stein (1849) gave a rather complete analysis and obtained 69 per cent. of tannic acid and 4 per cent. of other tannins.

Pereira (1850) again mentions the gall and figures it, stating that it is produced by an aphid.

Buchner (1851) considered the tannin present in these as the same as that of oakbark and he gave analyses of other galls for comparison.

The first account to appear in an American journal was published by Archer (1865). After mentioning the Chinese and Japanese galls he says: "There is a gall called *Kakarasinghee* or *Kakrasingee* produced on *Rhus Kakrasinghee* (Royal) used by the tanners of India." He also mentions a gall he has from Shanghi, which he states is intermediate between the *Kakarasinghee* and the *Woo-pei-tsze*.

In India *karkata sringi* is sometimes applied to a gall on *Rhus*. This name, however, should seemingly be used for the gall mentioned above by Archer. The tree he speaks of is the northwest form of *Pistacia khinjuk* Stocks and the galls on this are the *karkata sringi* of the Sanscrit. Various names are used in the different languages as *kakrasingi* (Hind.), *kakra-sringi* (Beng.), *kakara-shingi* (Tel.) and *dushta-puchattu* (Kan.). In Tamil, however, *kadi kasi-pú* is used for these galls and *kakkata shingi* often applied to the galls on the *Rhus succedania*. The former tree can hardly be confused as it has been well known many years, the wood being sold as lumber up in the hills at Simla and elsewhere. *Rhus semialata*, which is the host of the Chinese galls in Japan and China, occurs in the outer Himalayas, according to Watt (1892), but, so far as the writer can learn, is not galled there. It would seem then that none of the various forms of the *karkata sringi* are the

galls formed by *chinensis*. Smith (1871), however, in speaking of these galls under the title "nutgalls," says. "This excrescence, called in India *Kakrasingie*, is produced by a *Coccus*, and is said to sometimes attain the size of a man's fist." Further study on the inmates of the galls from different parts of India would seem desirable.

Viedt (1875) made a chemical study of the Chinese galls and found 72 per cent. of tannin.

Hanbury (1876) says that he has satisfied himself by an examination of the galls and tree that these galls do not occur on *Distylium racemosum*, as stated by some pharmacologists, but on *Rhus semialata* Mur. The date here given for Hanbury's paper is that of his collected papers. The original papers were printed much earlier.

Courchet (1879) gives a rather extended discussion of these galls and refers to them under the name *Poey-tse*. He says they occur on *Rhus semialata* and according to Fluckiger on *Rhus japonica*. He made a study of the structure of the gall and credited the name of the insect, *chinensis*, to Doubleday.

Ishikawa (1880) made a study of the galls in Japan and obtained tannin ranging from 58.82 per cent. to 67.7 per cent. This would seem to be the first chemical study of the Japanese galls.

Lichtenstein (1883), after studying the insect which produces the Chinese gall, described a new genus, *Schlectendalia*, for the species. This generic name is the one which has generally been applied to the insect by subsequent writers who were acquainted with it.

Hartwich (1884) made a study of the Japanese gall and after comparing it concluded that it was the same as the Chinese one produced by *chinensis* Bell.

Uyeno (1886) gave an article on the Japanese gall, showing its distribution in that country.

Trimble (1892) gave a short account of the Chinese gall and considered the Japanese one distinct. He gave an excellent bibliography from the point of view of the tannins.

Shirai (1895) studied the galls on *Rhus semialata* and de-

scribed as well the insects producing them. Both alate and apterous forms were described. He secured galls of two different types. The first is undoubtedly the true Chinese gall formed by *chinensis*. These galls develop on the winged petioles. His other gall is an entirely different thing very irregular in shape and somewhat suggesting the gall of *vagabundus* Walsh. The insect producing it has a short stigma and one oblique vein in the hind wing.

Sasaki (1910) studied the life history of the species as occurring in Japan. He secured the stem mother, forming a small gall on the under surface of the leaf petiole in May. These stem mothers produce from 17 to 18 young. By the end of June the galls are divided into chambers, while toward the end of July the finger-like projections of the galls are present with usually two young of a stem mother in each projection. Toward the last of August the galls contain numerous females of the second generation and many young of the third. In October, young of the fourth generation are present and in this month also pupae appear. During October and November the galls open and alate forms are freed.

The young of these alate forms Sasaki was unable to keep alive on *Rhus*, but he concludes that this was due to unnatural conditions and that these young should remain over and "wake up" in May and commence to form new galls. No males were observed.

Butler (1911), after a brief general account, says: "The escape of the insect takes place on the spontaneous bursting of the walls of the vesicle, probably when, after viviparous reproduction for several generations, male winged insects are developed."

Thorp (1912) makes reference to the Chinese galls and states that commercially they are more used than those from other trees, as the results obtained are much better.

Fitch (1866) described a species of aphid forming galls on *Rhus* in this country under the name of *Byrsocrypta rhois*, and this is the species now generally known as *Pemphigus rhois*.

(Fitch). This species forms a bladder-like gall on the under side of the leaves of *Rhus glabra* and these galls seem not to develop until late summer.

Galls collected on July 1st in Virginia are still very small and not yet well developed. In galls at this time can be found the stem mother of the gall and from two to a dozen or more young. By the first week in August the galls are considerably larger and contain several hundred insects, many of them in the earlier pupal instars. By the end of August the galls often reach one inch in diameter and if they are opened will be found to contain large numbers of alate insects, and it is not until the early fall that these alate forms usually leave the galls. They may be found flying at the last of October. The galls contain from 60 to 70 per cent. of tannin, an amount nearly equal to that of the Chinese galls.

Walsh (1866), in studying this species, erected the genus *Melaphis* with *rhois* as type and in this description refers to the Chinese galls, stating that "It would be very interesting to know whether the plant lice found in them are generically related to ours."

In the collections of the Bureau of Entomology there are numerous specimens of the Chinese galls and an examination of them has shown that many still contain their inmates. On mounting, these alate forms are found to agree in general characters with *rhois* Fitch and quite easily fall in the genus *Melaphis* on the distinct shape of the stigma, etc.

It will be seen also that the methods of life of the two species, *chinensis* and *rhois*, are very similar, the alate forms leaving the galls in the fall. What becomes of these forms seems to be unknown and the writer has been unable to determine this for *rhois*.

Considering the similarity in structure, the similarity in life history and the fact that both species occur upon plants of the same genus, as well as the fact that these two species are quite different from other species in the tribe, it would seem that there is no good reason for keeping them in different genera. In such case *Melaphis* is the generic name that must

be used and the species forming the Chinese gall will become *Melaphis chinensis* (Bell). The more important publications on the species follow. Mr. S. A. Rohwer supplied me with the references to Smith (1871) and Trimble (1892).

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EXPLANATION OF PLATE XXVI.

- Fig. 1. Illustration of the *Wu-p'ei-tsec* from the Pén tsao Kang mu.
 Fig. 2. Galls produced by *Melaphis chinensis*.
 Fig. 3. Wing of *M. chinensis*.

Clouds of Butterflies (Lep.).

I have seen clouds of butterflies, all of the same species, passing over a district [in the Congo] for three months at a time, like flakes of red snow, and in such close array that one could destroy dozens of them by throwing one's hat on the ground. The real savage beast of Equatorial Africa, and the most formidable, is the insect.—CUREAU, *Savage Man in Central Africa*, London [n. d. 1915], pp. 217-218.

Outbreaks of the Elegant Looper (*Philtraea elegan-* *taria* Hy. Edw.) on Privet in Louisiana (Lep.).

By E. S. TUCKER, State Agric. Exper. Sta., Baton Rouge, La.

The occurrence of numbers of a looper caterpillar, each dangling at the end of a thread of web suspended from branches of Amoor privet (*Ligustrum amurense*), first drew the writer's attention to the insect in May, 1913, at Baton Rouge, Louisiana. Close inspection of the plants revealed the presence of feeding larvae, and ample evidence of their depredations on the leaves. The privet formed a row of untrimmed bushes which had grown to a height of at least 12 to 15 feet, having a wide spread of branches. Owing to the distribution of the larvae through the rankest growth, hardly any appreciable defoliation became noticeable until along in the following June when the maximum infestation was reached.

Pupae were readily found at every inspection made in the intervals, being generally attached to the trunks and thick parts of the branches, although many occurred upon posts and sides of a building in close proximity to the privet growth. The latter situations had been reached through the wandering of several caterpillars, which, having first dropped from the bushes to the ground after spinning out their threads, sought the other elevations and pupated on them. From collections of the pupae, adults emerged on May 30, also June 15 and 19.

With the corresponding appearances of moths in the open, eggs were found deposited on leaves and stems by June 15 and 19. The specific name of the moth was determined as *Philtraea elegantaria* Hy. Edw., from specimens submitted to the Federal Bureau of Entomology, through the kindness of Dr. F. H. Chittenden, who likewise gave identifications of the two following species of reared hymenopterous parasites.

The parasitic attacks killed a large proportion of the pupae. Of the species obtained, *Chalcis ovata* Say, which emerged in the cages on June 9 and 19, proved to be the prevalent parasite. A few *Eutelus* sp. matured on June 19. The former enemy seemed able of itself to greatly limit the issue of moths so that further infestation of the privet was reduced to but

few caterpillars at any time through the remainder of the season. These individuals, however, persisted in appearing on the plants until late in September.

An additional parasite, but the only one obtained of its kind, afforded special interest, a Tachinid fly, which emerged on June 9. This specimen was determined as a female of *Phorocera (Euphorocera) claripennis* Macq., by Mr. W. R. Walton, through the courtesy of Dr. L. O. Howard.

Only casual attention was given to the elegant looper in the subsequent seasons, owing to the lack of opportunities for carrying on regular observations. On May 12, 1915, Mr. Thos. H. Jones, Federal entomologist, reported that he found larvae quite commonly attacking the foliage of a hedge of the same kind of privet. A brood which was considered to be the second one of the season attracted the notice of the writer on July 14. These caterpillars showed a preference for the lower shaded regions of the foliage. The third outbreak was observed on August 19, and the looper then appeared to be scarcely more than half-grown at the most. Several large branches of the tall bushes were practically defoliated at the time. Full grown larvae were seen traveling away from the privet hedge on September 7 and 8, being evidently in search of other places for pupation. Scattered individuals, however, still remained on the plants. Fresh pupae also appeared hanging to the branches.

A complaint of injury made during the year of 1913 led to the suspicion that the trouble in the case had been due to ravages by the elegant looper. The inquirer wrote from Opelousas, St. Landry Parish, under date of October 30, stating that the leaves of his hedges had been eaten by "small white insects." Some of the plants had died and the ones yet surviving had only a few leaves left on them. He desired to know a way to preserve the growth.

His mention of the pest in such terms as cited was thought to refer to the common whitefly (*Dialeurodes citri* R. & H.) in mistake for the real devastator. Otherwise, his remarks clearly implied that some pest capable of defoliating the plants had

been involved. Nothing else than the looper could be fixed upon as the probable insect. Naturally, at the time, it would have run its course and disappeared, and therefore be beyond treatment.

The North American Species of *Trigonoderus* Westwood, Females (Hymen.).

By A. A. GIRAULT, Glenn Dale, Maryland.

Antennae 13-jointed, two ring-joints. Pronotum more or less quadrate. Parapsidal furrows complete. Scutellum with a punctate cross-suture near apex. Abdomen elongate with a short stylus. *T. varipes* Viereck is not included since it bears incomplete parapsidal furrows. Dark metallic green, scaly punctate. Large species.

I. Wings with a macula at the stigmal vein.

Legs (except the coxae) and the scape pale yellowish or reddish.

Substigmal blotch along the proximal side of the stigmal vein and extending beyond its apex. Clypeus at apex entire. Segment 2 of abdomen entire.

Abdomen centrally suffused more or less with brownish. Propodeum uniformly, finely punctate, with a median carina only, the foveae along cephalic margin not coarse nor conspicuous, the spiracle minute, round, central. Third tooth of mandible acute. Slender. Funicle 1 nearly thrice longer than wide. Tegula red. Slender, not large. Length 3.5 mm.

algonquinia new species.

Substigmal blotch from the apex of the stigmal vein, thus free from it. Clypeus at apex with an acute tooth mesad. Segment 2 of abdomen caudad deeply incised.

Abdomen wholly metallic. Propodeum shining, more or less scaly, impunctate, with median and lateral carinae, the foveae along cephalic margin large, coarse, the spiracle nearly central, large, oblong. Mandibles 3- and 4- dentate, the last tooth truncate. Robust. Pedicel reddish beneath and at apex. Clypeus glabrous. Length 5.5 mm.

unguttus new species.

II. Wings hyaline or subhyaline, with no distinct macula.

Legs yellow.

Antennae brownish yellow, the pedicel metallic, contrasting. Abdomen "flattened, rounded."

aegeriae Ashmead.

Antennae black, scape and pedicel yellow. Abdomen long and conical, stilate at apex, distinctly longer than the rest of the body. Propodeum finely punctate, with a coarse spiracular sulcus, a median carina and a large, rounded fovea nearer the spiracle than to meson and near cephalic margin. Spiracle oval, moderate in size, more cephalad. Mandibles 3- and 4-dentate, the last tooth truncate. Funicle joints elongate, the pedicel short. Segment 2 of abdomen entire. Postmarginal vein elongate, subequal to the marginal. Length 5 mm.... *conicus* new species. Coxae and femora (except broadly) at apex, concolorous; antennae entirely concolorous; abdomen shorter, nonstylate. Clypeus with three conspicuous teeth; mandibles tridentate, the last tooth broad and truncate. Propodeum strongly tricarinate, with three abbreviated rugae from cephalad between median and lateral carinae; spiracle moderate in size, oval, cephalad. Segment 2 of abdomen occupying a third of the surface, glabrous, slightly emarginate at meson caudad, rest of body densely scaly. Venation as in *conicus*. Pedicel as long as funicle 6; funicle 1 wider distad, twice longer than wide, 2 somewhat shorter, 3 and 4 each a fourth longer than wide. Length 3 mm. *nonstylatus* new species.

Trigonoderus algonquinia n. sp.

Two females, Algonquin, Illinois (W. A. Nason).

Type: Catalogue No. 20899, U. S. National Museum, the specimens pinned and on a tag, a slide bearing appendages.

Trigonoderus unguittus n. sp.

One female, Bladensburg, Maryland, September (W. H. Ashmead).

Type: Catalogue No. 20900, U. S. National Museum, the female on a tag, appendages on a slide.

Trigonoderus conicus n. sp.

One female, Arizona (E. A. Schwarz).

Type: Catalogue No. 20902, U. S. National Museum, the female on a tag plus a slide.

Trigonoderus nonstylatus n. sp.

Parasitic on a cecidomyiid, Eastern U. S. One female.

Type: Catalogue No. 20903, U. S. National Museum, a female on a tag, appendages on a slide.

The types of *aegeriae* have not been seen.

A Phylogenetic Study of the Lateral Head, Neck and Prothoracic Regions in Some Apterygota and Lower Pterygota.*

By G. C. CRAMPTON, Ph.D.

(Plate XXVI.)

Of the eight groups of lower Pterygotan insects here discussed, the Plecoptera are structurally the most similar to the Lepismids, and have apparently departed much less than the typical Blattids have from the ancestral condition of the Pterygota in general. Together with the Ephemeroptera, the Plecoptera are undoubtedly the lowest living winged insects, and, since the Lepismids (i. e. such forms as *Lepisma*, *Nicoletia*, etc.) form a sort of "connecting link" between the lower Pterygota and the more primitive Apterygotan forms (such as *Campodea*, *Japyx*, etc.) it is preferable to begin a study of the groups in question with a comparison of the conditions found in the Lepismids and Plecoptera.

In comparing the heads of the Lepismids (Plate XXVII, Fig. 1), the Blattids (Fig. 2), and an immature Plecopteron (Fig. 4), it is at once apparent that the Plecopteron is structurally much nearer the Lepismids than the typical Blattids are. Thus, in both Lepismids (Fig. 1) and Plecoptera (Fig. 4) the head is markedly prognathous (i. e. mouthparts directed forward), while in the typical Blattids (Fig. 2) the head is markedly opistognathous (i. e. mouthparts directed backward). I am not sufficiently familiar with the Blattid group to know what extremes of variation are to be found among these insects, but, although some Blattids which I have not seen may also have heads of the prognathous type, it is nevertheless true that the condition depicted in Fig. 2 may be taken as typical for the Blattid group in general, in the following discussion.

The head contour is essentially similar in both Lepismids and the Plecopteron (Figs. 1 and 4); but the outlines of both heads differ very markedly from that of the Blattids (Fig. 2). Furthermore, the nature of the labium, and its mode of attach-

* Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.

ment to the head is much more "Lepismid-like" in the Plecopteran (Fig. 4) than in the Blattids (Fig. 2). In the same way the location of the "compound" eyes, and the position of the antennae are quite similar in the Lepismids and Plecopteran; but both differ strikingly from the Blattids in these respects. The clypeus and labrum also, are more alike in Lepismids and the Plecopteran, than these structures are in the Lepismids and Blattids, and the mandible of the Plecopteran is nearer the Lepismid type than the Blattid mandible is. In other words, the evidence to be gained from a comparative study of the external morphology of the head, would point to a close relationship between the Lepismids and the Plecoptera, and a much more distant relationship between the Blattids and Lepismids.

In taking up a consideration of the neck and thoracic regions in the Lepismids one finds (as might be expected) that the Lepismids have retained a condition resembling that found in the lower Apterygotan forms (such as *Japyx*, *Eosentomon*, etc.) rather than such a condition as occurs in the Pterygotan insects. The thoracic sclerites of *Japyx*, *Eosentomon*, etc., have been homologized in a paper dealing with the nature of the neck region of insects in general (which will shortly appear,* in the "Annals of the Entomological Society of America"), so that it is unnecessary to describe them here, since one may simply compare the accompanying figure of *Lepisma* (Fig. 1) with those of *Japyx*, *Eosentomon*, etc., in the aforementioned article. I would call attention, however, to the anterior transverse pronotal sclerite designated as "Pt" in Fig. 1. This sclerite is clearly the homologue of the transverse pronotal sclerite labeled "Pt" in Figs. 9 and 7; and it is in the tergal region that the Lepismids apparently approach the condition found in certain lower Pterygota, more closely than in any other thoracic structures.

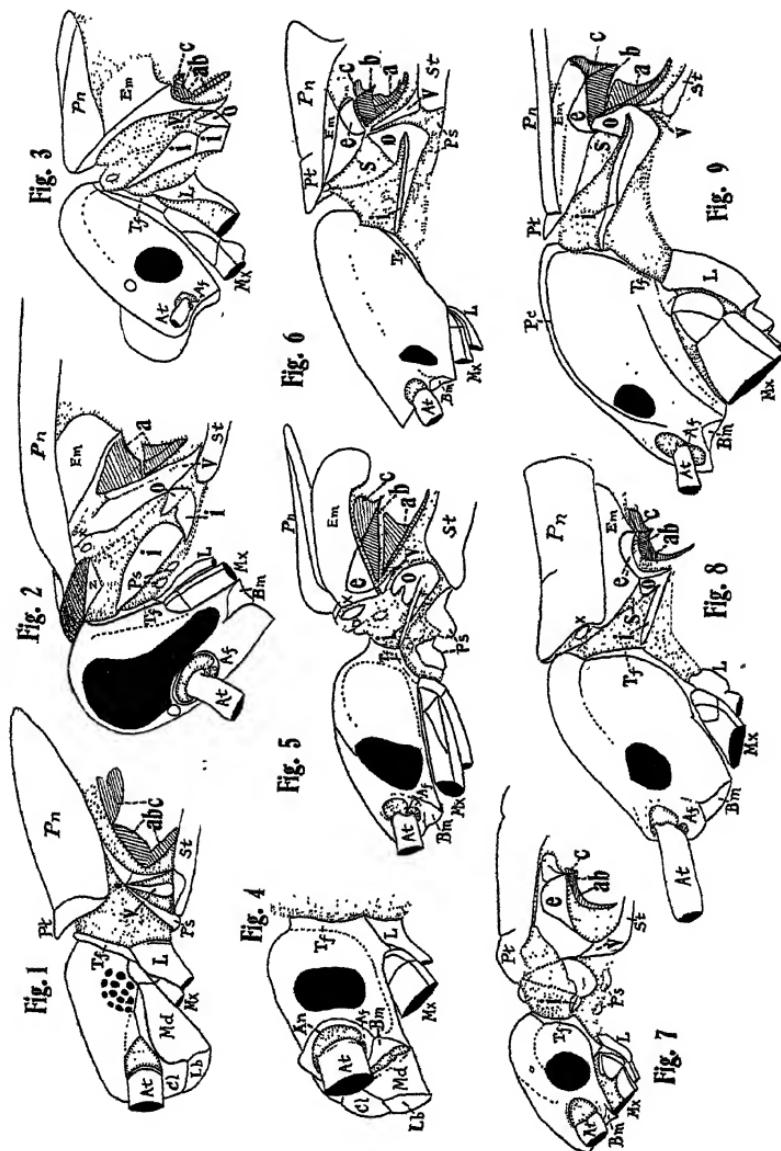
The trochantin-like region "abc" (termed the "eutrochantin" in the paper referred to above) of the Lepismids (Fig. 1) is also somewhat similar to that found in Figs. 6 and 7, since it

* Subsequently published in Vol. X, page 187, of the "Annals" for 1917.

intervenes between the coxa and the true pleural sclerites; but the remainder of the prothoracic sclerites of the Lepismids are somewhat different from the typical sclerites of the lower Pterygotan forms. In this respect, *Nicoletia* would have been a better insect than *Lepisma* for a comparative study of the thoracic region, but I have hesitated to spoil my only specimen of *Nicoletia* by subjecting it to the staining process with nitrate of silver, etc., which is necessary to differentiate the sclerites from the membrane in these weakly pigmented forms.

There are two principal types of head found among the Apterygotan insects, namely the broad, flattened type, occurring among certain Lepismids, etc., and the more pear-shaped type, occurring in *Japyx*, etc. I find these two types represented among the Myriopods (*sensu lato*) and also among the Crustacea, so that these two types were apparently differentiated at a very early stage of development, and both were doubtless present among the first insects to be evolved. In fact, I believe that flat, broad-bodied forms as well as the more cylindrical, slender-bodied forms occurred among the ancestral insects (for such types also occur among the Crustacea, etc.), so that it is incorrect to say that the original insects were of this or that type, since *several* types must have been in existence at the very beginning of the development of insects. It is thus evident that insects are not the product of one type of ancestral forms alone, but the ancestral insects doubtless differed as much (if not more) among themselves as the modern representatives of the different families composing an order of insects differ among themselves.

It is undoubtedly true that throughout the animal kingdom, many living forms have departed but little from the ancestral condition characteristic of the early stages in the development of other living groups, and are fully as instructive as fossil forms are, in furnishing us with connecting links between many of the greater groups of the animal kingdom (such, for example, as the living Dipnoi, which furnish us with intermediate forms annexed between the fishes and Amphibia). In the same way, certain living insects have departed but little



LATERAL HEAD AND PROTHORACIC REGIONS.—CRAMPTON.

- | | | |
|------------------------|------------------------|-------------------------|
| 1. <i>Lepisma.</i> | 2. <i>Periplaneta.</i> | 3. <i>Termes.</i> |
| 4. <i>Pteronarcys.</i> | 5. <i>Echinosoma.</i> | 6. <i>Embia.</i> |
| 7. <i>Capnia.</i> | 8. <i>Timema.</i> | 9. <i>Grylloblatta.</i> |

from the condition characteristic of the ancestors of certain other hexapodan groups, and, to my mind, the study of recent forms is even more instructive than the study of fossil insects, from the phylogenetic standpoint, since we are able to compare together more detailed structures in living forms, than it is possible to do in the distorted and usually imperfectly preserved fossil forms, the most of which are practically as highly specialized along their own lines of development as the most primitive of living forms are!

In the interesting insect *Grylloblatta campodeiformis* Walker we hold the key to the genealogy of the Orthopteroid insects (such as the Tettigonids, Gryllids, Locustids, etc.) and any attempt to trace the ancestry of these Orthopteroid forms, in which the evidence of affinities with the lower groups, furnished by the study of *Grylloblatta*, is ignored, is foredoomed to failure. On this account, I would present some of the evidence of relationship gained from a comparative study of the Grylloblattids and Embiids, since I am convinced that the Grylloblattids are extremely closely related to the Embiids, and are therefore ultimately to be derived from Plecoptera-like ancestors (since the Embiid line of development parallels that of the Plecoptera more closely than any of the lowest Pterygotan forms).

In an article dealing with the antennae of the Grylloblattids and Embiids, which will shortly appear* in the Canadian Entomologist, I have pointed out the astonishing similarity in the antennae of these two groups of insects—a similarity shown not only in the close agreement in the number of antennal segments, but which extends even to the more minute details of relative size and outline in the individual segments of the antennae in the two groups. On the other hand, the antennae of both Embiids and Grylloblattids are entirely different from those of the typical Blattids in regard to precisely those features wherein they are most similar to one another! In the present paper, I would endeavor to demonstrate that the remarkable

* Subsequently published in Vol. XLIX, No. 6, page 213, of the Canadian Entomologist.

similarity between the antennae extends to the neck plates, and other structures as well, in the Embiids and Grylloblattids, and in these features also, the Grylloblattids differ from Blattids (which some investigators would consider as their nearest relatives).

In conformity with the general depressed condition of the body, the head of *Embia* (Fig. 6) is somewhat flattened, but aside from this fact, and the modifications which the Embiids have developed along their own lines, the head of a Grylloblattid (Fig. 9) is somewhat like that of an Embiid (although both differ from the Blattids in this respect) and is quite like that of the Phasmid *Timema* (Fig. 8) in outline. Not only are the heads of the Grylloblattids and Phasmids more prognathous, like that of an Embiid (while the head of a Blattid is more opistognathous), but the outline of the compound eyes, their extent upward along the sides of the head, the point of attachment of the antenna in relation to the eyes and to the base of the mandibles, etc., are infinitely more like those of an Embiid in the Phasmids and Grylloblattids, than they are like those of a Blattid, as may readily be seen by comparing Figs. 8 and 9 with Fig. 6 and then with Fig. 2.

The agreement in structure between the antennae of *Grylloblatta* and *Embia* is extremely striking, but the similarity between the neck plates and prothoracic sclerites of these insects is no less remarkable (and in these points of similarity both Embiids and Grylloblattids differ markedly from the condition found in the Blattids). If one will cover the heads of the insects shown in Figs. 6 and 9, so as to concentrate his attention upon the plates behind the head region, he will be immediately struck with the remarkable agreement between the sclerites of the Grylloblattids and Embiids—an agreement extending even to the minutest details! Thus, the anterior transverse region *Pt* in the pronotum of *Grylloblatta* (Fig. 9) finds its counterpart in the region designated as *Pt* in the pronotum of *Embia* (Fig. 6), the epimeron *Em* is very similar in both insects, and in the episternal region of both *Embia* and *Grylloblatta*, there is marked off a sclerite labeled *e*, which is demarcated by a curved suture in the two insects.

In *Grylloblatta* and *Embia* the "eutrochantin" *abc* (Figs. 9 and 6) is very similar, and is divided in the same fashion into regions *a*, *b* and *c*, essentially the same in both insects, even to the subdivision of the region *a* by an oblique suture, which, however, is not as distinct in *Embia* as in *Grylloblatta*. Furthermore, the laterosternite *v* of *Embia* (Fig. 6) is represented in *Grylloblatta* (Fig. 9) by a sclerite *v* of exactly the same nature, although it is more closely connected with the sternum *St* in *Grylloblatta* than in *Embia*. On the other hand, these sclerites in both insects are very different from those of the Blattids (Fig. 2).

In the neck region also there is a very close correspondence in the cervical sclerites of the two insects. Thus, the region designated as *s* in *Grylloblatta* (Fig. 9) is represented by a region designated by the same letter in *Embia* (Fig. 6), and the lateral cervical sclerite labeled *i*, with its partially detached portion, labeled *o*, is astonishingly similar in both insects, even to the presence in plate *i* of a longitudinal suture (to which extends the broken line from the letter "i") which is present in but few insects other than the Grylloblattids and Embiids. We find no such agreement between the Grylloblattids and Blattids, and the more features one examines in the insects in question, the more it becomes apparent that the Grylloblattids have practically nothing in common with the Blattids, and practically everything in common with the Embiids. The similarity between the Grylloblattids and the Embiids, (and the dissimilarity between the Grylloblattids) extends to the other structures of the body as well, as will be discussed in a series of papers dealing with these subjects, and these remarkable similarities between the Grylloblattids and Embiids (with the resulting dissimilarities between Grylloblattids and Blattids) must be explained before one can claim that the Grylloblattid line of development is to be traced back to Blattid-like rather than to Embiid-like ancestors, (and through the Embiid-like ancestors, to Plecoptera-like forebears).

The contour of the head is quite similar in the Phasmid *Timema* (Fig. 8) and *Grylloblatta* (Fig. 9), the character of the

neck plates *i* and *o*, and the region labeled *s* is much the same in both insects, but the remainder of the prothorax is somewhat different in the two forms. In regard to the pleural sclerites, and particularly in the character of the plate *abc* (Fig. 8) *Timeema* resembles certain Plecoptera, but, since I have been unable to obtain the Plecoptera I wished to use for this comparison, I would leave the discussion of the condition found in these insects, until the needed material is available for illustration. In connection with a study of the relationships of the Phylliids, I have recently been able to compare males of *Phyllum scythe* with the flattened Phasmids *Ectatosoma*, and this comparison has shown me that my former views that the Phylliids represent a distinct order, are too extreme. I would, therefore, now regard the Phylliids as a suborder of the Phasmid group, rather than as representing a distinct order, as I have stated in an article dealing with the antennae of the Grylloblattids and Embiids and the relationships of the Orthopteroid insects.

With regard to the relationships between the Forficuloid insects and other lower Pterygota, as indicated by a study of the head, neck and prothoracic regions, the lack of suitable Plecopteran material for comparison with the Forficulids makes it unprofitable to attempt to show the relationships of these two groups of insects at this time. A study of the body structures in general, however, has convinced me that the Forficulids are closely related to the Plecoptera, which doubtless represent as nearly as any living insects the common ancestral stock whence sprang the Forficulid and Embiid lines of development, and these studies indicate more and more clearly that the Blattids do not stand near the direct line of descent of the Orthopteroid forms, but comprise an offshoot arising from the main Pterygotan stem at a comparatively early period of phylogenetic development.

The Forficulids, as exemplified by the rather primitive genus *Echinosoma* (specimens of which were very kindly furnished me by Mr. C. C. Gowdey), are structurally quite similar to the Embiids and Grylloblattids. The head contour is not essentially different in the three groups (Figs. 5, 6, and 9), and the location

of the eyes, antennae, etc., are much the same in all three. (Compare also Fig. 4.) In the neck region of the Forficulid (Fig. 5) there occur two ventral plates *Ps* represented by two similar plates designated as *Ps* in *Embia* (Fig. 6; compare also Fig. 7). The lateral neck plates *i* and *o* are essentially the same in the Forficulid (Fig. 5) Embiid (Fig. 6) and Grylloblattid (Fig. 9), but a rather deep longitudinal fold of the integument in the plate designated as *i* in the Forficulids, presents a modification not met with in the other insects mentioned. In the prothoracic region, sclerite *e* of Fig. 5 is quite like its homologue designated as *e* in Figs. 6 and 9, and the components of plate *abc* are very similar in all three insects, thus indicating a close relationship in the three groups.

A study of the head, neck and prothoracic regions of the Termites reveals points of resemblance to the Blattids on the one hand, and to the Embiid-Forficulid-Grylloblattid "coterie" on the other. I have no specimens of the more primitive Termites, but an examination of the heads of specimens of Termites taken in the Carolinas, of a *Termopsis* from Arizona, and of *Termes bellicosus* from Africa (Fig. 3) would indicate that the prognathous condition is the original one for the group as a whole, although there is a marked tendency for the head to assume a more vertical position—a tendency which has been carried much further in the Blattids (Fig. 2), eventually producing a head of the opisthognathous type in the latter insects.

The contour of the upper portion of the Termite head suggests Blattid affinities, but the location of the eyes, antennae, etc., is more like the condition found in the other insects studied. The neck plates *i*, *i*, and *o* (Fig. 3) are extremely like those of the Blattids (Fig. 2), and the shape of the epimeral region *Em* is much the same in Figs. 3 and 2. The "eutrochanthin" *abc* (Fig. 3), however, is not like the trochantin *a* of the roach (Fig. 2), since this region in the roach does not completely intervene between the coxa and the pleural region. The lower portion of the region *a* becomes detached in both insects (Figs. 3 and 2) however, thus indicating a tendency common to

the two groups in this respect. On the other hand the general appearance of the region *abc* of the Termite (Fig. 3) is much more like that of a Phasmid (Fig. 8) or Plecopteron (Fig. 7). A study of the head, neck and prothoracic regions would thus indicate that the Termites are quite closely related to the Blattids, but have retained many characters suggestive of affinities with the other groups studied, and the Termites may thus be regarded as occupying a position somewhat intermediate between the Blattids and the other groups.

It would be inadvisable to base one's conclusions as to the relationships of the lower insects on a study of the head, neck and prothoracic regions alone, and the present paper is therefore but one of a series in which the different body regions have been compared part by part in the different groups; but I am hoping to show that a study of the other structures will in a large measure bear out the conclusions to be drawn from the regions here discussed. Other investigators would derive the Orthopteroid insects from Blattid-like forebears, and would also trace the Grylloblattid line of development back to a Blattoid ancestry; but it is only fair to demand that they shall produce equally convincing proof of their contentions, which should be drawn from the facts of comparative anatomy, since comparative anatomy, after all, furnishes us with the most reliable evidence of relationships, and is, in fact, the mainspring of all systematic work!

Before leaving the subject of the head structures, I would call attention to the antennifer, or antenna-bearing process *Af* which is usually situated midway up the outer portion of the antennal ring *An* in the Grylloblattids, Forficulids, etc. (Figs. 4, 5, etc.), while in the Blattids (Fig. 2) it has migrated mesalward, and in most of the members of this group (e. g. *Ectobia*, etc.) this antenna-bearing process is usually located higher up along the median portion of the antennal ring (i. e. on the side of the antenna toward the median line of the head). The position of the antennifer, however, is not sufficiently constant to be of any great value in determining the relationships of the groups in question.

Another feature which is quite similar in the Phasmids and Grylloblattids, but which is not sufficiently constant in outline to furnish a character of phylogenetic value, is the mandibulare *Bm* (Figs. 9 and 8), or mandible-bearing sclerite. Comstock, 1903, homologizes this sclerite with the trochantin of the leg of the thoracic segments, but it is more than doubtful that such a greatly reduced structure as the trochantin usually is, would be preserved in the mandibular segment. I would be much more inclined to regard this sclerite as representing the coxa of the mandibular appendage, but such speculation is not very profitable until one has carefully compared the mandibles of the Apterygota, Chilopods, Isopods, and lower Crustacea, in which the mandibles become successively more and more leg-like—a comparison which I have not yet had time to carry out. Furthermore, I am not yet prepared to say that the basal segment of the mandible of *Lepisma* (i. e. the portion of the mandible between the terminal portion *Md* and the trophi-bearing sclerite *Tf*, in Fig. 1) is the homolog of the mandibulare *Bm* of the Plecopteron nymph (Fig. 4), since several possibilities suggest themselves (e. g. the region immediately above the mandible in Fig. 1 may represent *Bm*) in comparing the head regions near the mandibles, in the two insects. In order to determine this point, it will be necessary to study a series of Plecopteron and Ephemerid nymphs, examining the musculature in each case, since the musculature furnishes many valuable clues in an attempt to homologize the various parts of a metamer or appendage.

A study of an extremely interesting series of heads, including the principal Apterygotan types, the Chilopods, Symphyla, Isopods, etc., has convinced me that the Isopods, Apterygota and "Myriopoda" (*sensu lato*) are very closely related and were derived from similar forebears. Since the Isopods were probably descended from ancestors resembling the sessile-eyed Arthrostraca (such as *Koonunga*, etc.), I would consider these Arthrostraca as very near to the common ancestors of Isopods, Insects, and "Myriopods." The Arthrostraca, in turn, were derived from ancestors similar to the Copepods

and Apodidae, and at the bottom of this stem, the Trilobites unite with the Crustacea, so that it is not surprising that certain Trilobite features might have been retained in some of the groups derived from their common ancestral forms. My own observations would lead me to consider the closely related Insects, Isopods, and "Myriopods" as derived from Arthrostraca-like ancestors, which in turn were derived from lower Crustacean forms ultimately related to the Trilobites, rather than to regard insects, etc., as descended more directly from Trilobite forebears, as certain recent investigators would maintain is the case. These points, however, can be more profitably discussed elsewhere.

The more intimate relationships of the insects considered in the foregoing discussion may be expressed by grouping them into three superorders as follows: The Blattoid, Mantoid, and Isopterous insects form one superorder (the *Pandictyoptera*), in which the head is typically (though not always) hypognathous, the lateral cervicals touch in the median ventral line, and the ventral cervicals, when present, are situated far forward, and occur as two narrow transverse bands somewhat crescent-shaped in outline. A fold of the posterior margin of the tergum projecting backward in two more or less pointed projections (the *postplica*) usually occurs in both meso- and metathoracic terga, and when the scutellum is demarcated, it is usually narrow and extends far forward into the scutal region. The mesothoracic coxae are usually much longer than broad, and the tarsi are typically pentamerous. Ovipositor present in some, absent in others. Styli present in some males.

The Emboid, Forficuloid and Plecopterous insects form the second superorder, the *Panplecoptera*, in which the head is typically prognathous, the lateral cervicals do not touch in the median ventral line, and the ventral cervicals instead of occurring as narrow transverse bands situated far forward in the neck region, are much broader and the posterior one occurs just in front of the prosternum. The mesothoracic coxae are usually as broad as long, tending to have a ring-like outline when viewed from the mesal surface, and the tarsi are typically trimerous. Ovipositor and styli usually absent.

The Grylloblattoid, Phasmoid and Orthopterous insects form a third superorder (the Panorthoptera), in which the head is frequently hypognathous, and the lateral cervicals usually do not touch in the median ventral line. The ventral cervicals are usually absent, but when present may be of either of the types mentioned above. The tarsi, typically pentamerous, may be reduced to four or three segments, though a series of five pads on the ventral surface is frequently retained, indicating that the pentamerous condition has not been long lost. The group is typically an ovipositor-bearing one and styli frequently occur in males. All of the insects previously mentioned belong to a single section (the Plecopteradelphia) connected by intermediate or annexent forms, and apparently descended from ancestors not very different from recent Plecoptera.

Since sending the foregoing discussion to the editor of the "News" an extremely important paper by Pantel, 1917 ("A Proposito de un Anisolabis Alado" in: Mem. R. Acad. Cienc. y Artes, Barcelona), has been published, in which he figures a series of Dermaptera including *Allostethus*, *Labidura* and *Anisolabis*, which furnishes an unusually clear illustration of the gradual fusion of the posterior portion of the eutrochantin (Fig. 5, *bc*), with the lower portion of the prothoracic pleuron, while the anterior portion of the eutrochantin (Fig. 5, *a*), remains free to form the so-called trochantin of the higher forms, thus offering a very conclusive demonstration of the claim made in a preceding discussion concerning the fusion of the posterior portion of the eutrochantin with the lower portion of the pleural region, etc.

In the appended list the abbreviations used in Plate XXVII are quite fully explained, so that it is unnecessary to discuss further the additional points of similarity in the groups of insects here shown, since homologous structures bear the same label throughout the series.

ABBREVIATIONS.

a, b, c—Sclerites composing the trochantin-like region called the eutrochantin, which intervenes between the coxa and the pleural

region in the Apterygota, and in the prothorax of the lowest Pterygota. In Fig. 2, *a* is the trochantin, from which the so-called trochantinelle has become detached.

Af—Antennifer, or antenna-bearing process.

An—Antennale, or ring at base of antenna.

At—Antenna, only portion of basal segment shown.

Bm—Mandibulare, or sclerite at base of mandible.

C1—Clypeus.

e—Curvipleurite, or curved pleurite marked off in the episternal region.

Em—Epimeron.

i—Laterocervicale, or lateral cervical sclerite, divided into two parts in Figs. 2 and 3, the sclerite *o* being marked off in the posterior part.

L—Labium. Only basal portion shown.

Lb—Labrum.

Md—Mandible.

Mx—Maxilla. Only basal portion shown.

o—Posterior portion of lateral cervical sclerite.

Pc—Paracephal suture.

Pn—Pronotum.

Ps—Two ventral cervical sclerites, the anterior of which is the intersternite, and the posterior one is the presternite, excepting Fig. 2.

Pt—Pretergite, or anterior transverse region of tergum.

s—Region in front of prothoracic epimeron, probably homologue of the lateropleurite of other segments.

St—Sternum of prothorax.

Tf—Trophifer, or trophi-bearing segment to which all three of the mouthparts are articulated in Fig. 1. It is a portion of the occipital region.

v—The laterosternite in Figs. 5, 6, 7 and 9. In others it is a region connecting sternum with pleuron.

x—Small plate in front of dorso-pleural region.

z—Dorsal cervical sclerite, or intertergite.

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EXPLANATION OF PLATE XXVII.

- Fig. 1.—Lateral view of head and prothorax of *Lepisma saccharina*, only basal portion of antenna, maxilla and labium represented. Specimen was stained with nitrate of silver, to differentiate the sclerites from the membrane.
Fig. 2.—Lateral view of head and prothorax of *Periplaneta americana*—as above.
Fig. 3.—Lateral view of head and prothorax of *Termes bellicosus*—as above.
Fig. 4.—Lateral view of head of nymphal *Pteronarcys*—as above.
Fig. 5.—Lateral view of head and prothorax of *Echinosoma*—as above.
Fig. 6.—Lateral view of head and prothorax of *Embia major*—as above.
Fig. 7.—Lateral view of head and prothorax of *Capnia*—as above.
Fig. 8.—Lateral view of head and prothorax of *Timema*—as above.
Fig. 9.—Lateral view of head and prothorax of *Grylloblatta campodeiformis*—as above.
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Habits of Some Burrowing Scarabaeidae (Col.).

By REV. J. C. WARREN, Sylvia, Kansas.

Here within a radius of two miles there are salt marshes, alkali beds, black loam and sand hills, and on the latter the species under consideration were found and observations made.

Phanaeus difformis LeC. is found in sand hills only, always choosing this sandy region to bore a straight hole almost parallel with the surface, close to a fresh manure dropping. The horn is used in lifting the sun-baked crust from these, also in connection with the thoracic shield to press the sand in making the pit; it is constantly used in boring and lifting, and is not altogether an ornament as has been supposed. When coming to the clay region the beetles will always turn back to the sand.

Phanaeus carnifex Linn. is found in black soil only, always choosing hard clay or sandy loam for its burrow, nearly at right angles with the surface, and usually the pit is close to the roots of a bunch of grass. An examination of the ground where the sand and black loam come together failed to show

that the two species encroached on each other's territory more than a few yards.

Canthon lecontei Horn is an interesting little species which makes a well in the sand one-quarter inch in diameter and three inches deep, close to or under a fresh rabbit pellet, drops the latter to the bottom of the pit and there bores to its center and lays the egg. This small shiny black species when disturbed will fold its legs and have the appearance of seeds of the surrounding weeds and is apt to be overlooked.

Bradycinetus fossator Hald.—The first impression at sight of the burrow of this species is as though a carpenter had used a half-inch auger and left the chips around the hole. The great burrowing crickets of this section, having similar holes, caused considerable extra work until experience enabled me to separate each at sight. The use of a spade a number of times failing in results, a dry weed stalk was pushed down the pit and the sand dug away on one side within two inches of the stem or hole and the rest carefully removed with the fingers, when the beetle would be found at the bottom, sometimes both sexes being present, at other times either sex singly. The well would be perfectly straight and about fourteen inches deep. The species is not scattered but usually restricted to small areas in apparent colonies. A strong light placed on the sand near the burrows yielded from three to five specimens per evening.

Strategus mormon Burm. is a true sand hill species, somewhat restricted as to area, occurring in but a few acres, but there in abundance. It bores a well one inch in diameter and eighteen inches deep, then fills in with layers of old dry horse manure, which is about a year old and in which the eggs are laid. Judging by the different stages in which I found specimens I suspect it takes three years in the larval state for development.

Strategus mormon and *Phanaeux difformis* both seem to miss the old buffalo chips and do not seem to thrive as well on the manure of domestic animals.

All the species were taken from the middle of May throughout the month of June.

Early Spring Syrphidae in California and a new Pipiza (Dip.).

By W. M. DAVIDSON, U. S. Bureau of Entomology, Sacramento, Cal.¹

The writer has been collecting Syrphidae in the coastal districts of central California the past six years and has therefrom secured considerable data on the appearance of these flies in spring. This paper aims to discuss those species which in the adult stage reach their maximum numbers before April and to briefly note others which have been taken in flight during the first three months of the year. The writer is aware of the arbitrariness of fixed dates in connection with the habits of insects and hopes exception will not be taken to his use of them here.

The average daily mean temperature of February is about 50 F. and of March about 54 F. in the region above cited. Frost are comparatively unusual after February 15 and in March the temperature rarely drops below 35 F., while frequently arising to over 70 F., yet there is probably greater annual variation in the March meteorological conditions than in those of any other month.

Syrphidae in this locality are most abundant on the wing in the months in which most of the wild flowering plants bloom—April and May—and thereafter are on the wane during the dry summer until September and October, when a “revival” occurs and the autumn blossoms such as *Baccharis pilularis* Roe. and *Aster chamissonis* Gray yield good collecting. The writer has taken thirty-two species of Syrphidae in March as against fifty-eight in April and May combined. It is probable that several of the species collected in April but not in March are occasionally abroad in the earlier month.

In normal seasons five species have been observed to reach their maximum numbers in the adult stage before April. These are *Crioprorra cyanella* O. S., *Cr. alopex* O. S., *Cheilosia occidentalis* Will., *Sphegina* sp. (near *rufiventris*), and *Syrphus*

¹ Published with the permission of the Secretary of Agriculture.

arcuatus Fallen. The first two may be considered together in a single group: These flies appear first about February 20 and may be found visiting the blossoms of almond and Myrobalan plum for about three weeks. Thereafter they are very scarce and do not occur beyond April. Osten Sacken reared the former species from pupae found under oak bark and the writer has reared *alopex* from pupae found in a similar location. The flies move rapidly and are not easy to capture while feeding, as they prefer to alight on the higher branches of trees. They occur both in the valley floors and in the hills and are typical early spring species.

Cheilosia occidentalis, which is very similar in general appearance to the European *Ch. variabilis* Panzer, appears towards the end of February, reaches its maximum about March 25 and during April rapidly declines in numbers. After April it is rarely to be found. This species is rare in the valleys but abundant in the hills near water. The males are greatly attracted to plum and other blossoms and the females are more often seen resting on low herbage. Both sexes are easily captured. The metamorphoses are not known, but presumably occur in plant tissues.

The *Sphegina* appears in flight about March 15, reaches its maximum abundance about the end of March and then gradually decreases in numbers through April, May and June: Males are much more commonly observed than females, the former greatly resembling some of the small ichneumonid wasps as they hover and dart among flowers. They may be taken in March about Toothwort (*Dentaria*) and fruit trees, and later about bridal wreath (*Physocarpus capitatus* Pursh.). Females occur mostly on low vegetation near water. Metamorphoses unknown. A common species in hilly localities, rare in valleys.

Syrphus arcuatus reaches its greatest abundance earlier than any other predaceous form. Adults appear occasionally in January on willow catkins, *Laurustinus* and *Brassica*, are to be found in fair abundance on warm days in February, and are most numerous in the latter half of March. Thereafter

they may be taken up to November, but never in such abundance as in March. The writer has collected larvae from aphids on conifers in early March, indicating oviposition in February. The larvae serve as a check upon *Chermes* and *Lachnus*, especially the former. The flies inhabit both valleys and hilly places, visiting flowers and aphid infestations.

Earliest collection dates are as follows:—*Crioprora cyanella*, February 27, 1914 (San José) and February 27, 1915 (Walnut Creek); *Crioprora alopec*, February 27, 1914 (San José); *Cheilosia occidentalis*, February 12, 1913 (Walnut Creek); *Sphegina* sp., March 23, 1914, and March 23, 1915 (Walnut Creek); *Syrphus arcuatus*, January 12, 1913 (Walnut Creek).

Twenty-seven other species have been collected by the writer before April. In January small numbers of *Melanostoma obscurum* Say (?), uniformly the earliest syrphid abroad, *Eristalis tenax* Linn. and the two economic *Catabomba pyrastris* Linn. and *Syrphus opinator* O. S., are on the wing. In February these become more abundant and here and there a few examples of *Eristalis hirtus* Loew, *E. aeneus* Scopoli, *Mesograpta geminata* Say, *Eupeodes volucris* O. S., *Sphaerophoria sulphuripes* Thompson, and *Syrphus americanus* Wied. are observable. These six species later become abundant and with the exception of *Eristalis aeneus*, pre-eminently a garden species, have a wide range of habitat. Up to the middle of March four additional species appear. These are *Paragus tibialis* Fallen, *Syrphus intrudens* O. S., *Eristalis occidentalis* Will. and *Helophilus mexicanus* Macq. *Syrphus intrudens*, unlike the other common members of the genus, is quite rare in the valleys though abundant in the hills. In the last half of March there is a very pronounced increase both in the number of species and of individuals abroad. In the valleys appear *Pipiza californica* sp. nov., *Syrphus protritus* O. S., *Chrysogaster sinuosa* Bigot, and *Syritta pipiens* Linn.; in the coast range hills, besides these four, *Volucella facialis* Will., *Cheilosia townsendi* Hunter, *Ch. willistoni* Snow, *Chrysochlamys croesus* O. S., *Xylota nemorum* Fabr., *X. barbata* Loew, *Crior-*

hina humeralis Will., *Chrysotoxum integre* Will., and *Baccha obscuricornis* Loew.

The writer is indebted to Mr. F. Knab, U. S. National Museum, for the identification of many of the species listed above.

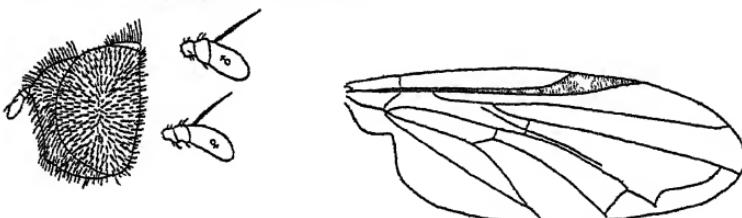
Pipiza californica sp. nov.

Length 6.25 mm. to 7.75 mm., average about 7.30 mm.

♀.—Oval, shining black without yellow abdominal markings. Face and front: Width almost equal throughout, at ocelli four-fifths that at base of antennae, from antennae to mouth constant; profile straight, gently receding from antennal tubercle to mouth; ground color shining black, covered below antennae with white, above antennae with white and light yellow pile; on vertex there is a tuft of long white pile; in middle of front a shallow transverse groove and an interrupted transverse stripe of white pollen which is prolonged shortly down anterior orbits, its extremities briefly separated from the upper limits of the narrow pollen band which follows the orbits around the eyes to the vertex; occiput fringed with white pile; cheek shining black, clothed with pale yellow pile. Eyes covered with rather long white pile.

Antennae: Black, under side of third, and sometimes of second, joint reddish-yellow or reddish-brown; basal joints black pilose; terminal joint elongate oval, somewhat exceeding in length the combined basal joints; arista bare, brownish-black, basally reddish-yellow but sometimes all brownish-black, in length slightly exceeding the third joint; third joint almost twice as long as broad.

Thorax black, shining, the anterior half more brightly than the posterior; pile white or light-colored. Scutellum black, obscurely shining, with rather long light-colored pile.



Pipiza californica sp. nov. Head and wing of male, antennae of male and of female.

Wings hyaline, stigma light amber; last section of fourth longitudinal vein rectangular and petiolate near base, angulated before middle into first posterior cell, the re-entrant angle thus formed sometimes petiolate; outer angle of discal and first posterior cells acute to rectangular; halteres light yellow, knob brown in centre.

Legs black with white pile; knees, base of tibiae, two basal joints of anterior four tarsi reddish-yellow or reddish-brown; pile on inferior surface of tarsi and tibiae golden yellow; hind metatarsi slightly thickened.

Abdomen wholly shining black with white pile, more abundant on sides than on disc; abdomen oval, equal in length to head and thorax combined; maximum width slightly exceeding that of thorax.

♂.—Body narrower than in female, general character similar. Head: Vertical triangle shining black with more or less black pile in region of ocelli; frontal triangle shining black, on sides with black pile, in center and above with light-colored pile (some specimens have the pile all black except for a few hairs just above antennae). Eyes contiguous for about 10 facets.

Antennae: Length somewhat variable, in general shorter than in female, shape of third joint more orbicular, coloration similar.

Thorax black shining, clothed with light yellow pile, which is longer than in the female.

Legs colored as in female, in some specimens the apical and basal fourth of tibiae and the first three tarsal joints of anterior four legs are yellow.

Abdomen with broad, ill-defined dull black bands at the bases of segments, elsewhere shining metallic; pile light yellow and white, abundant along the sides and much longer than in the female.

Described from 6 females and 14 males.

Type ♀ and allotype ♂ in the collection of the U. S. National Museum.

Type locality, Walnut Creek, Calif.

A common valley species appearing towards the end of March. The adults have been taken until October, but are not abundant after May. In 1913 they were very abundant in spring, flying about wild rose bushes (*Rosa*) and since then they have been observed frequently in April about blossoms of poison oak (*Rhus diversiloba* T. & Gr.), in May about grape flowers, and throughout summer about aphid infestations on trees such as Black Walnut (*Juglans californica* Watson). The larvae is aphidophagous, a male fly having been reared in May, 1914, from a larva found feeding upon the sexes of *Pemphigus populicaulis*, Fitch (Aphid.) underneath detritus about poplar bark.

The author had previously considered this species *P. pisticoides* Will., and has twice referred it to that species (Jour-

nal Econ. Ent., Aug. '15, p. 421; Oct. '16, p. 456), but Mr. F. Knab, U. S. National Museum, has pronounced the species new. It is evidently closely allied to *P. pisticoides* Will. and to *P. pistica* Will. *P. californica* is recognizable in the female through the wholly shining abdomen clothed with white and light colored pile; in the male, through the dull bands at the base of the segments and in the longer pile.

The author is indebted to Mr. F. Knab for helpful suggestions in drawing up the description.

Preliminary List of North Dakota Wasps exclusive of Eumenidae (Hym.).

By O. A. STEVENS, Agricultural College, North Dakota.

While collecting flower-visiting insects in the State the past seven years, the writer has taken a considerable number of wasps, although giving special attention to bees. It has been possible to have nearly all of these identified, and especially as very little has been published concerning the insects of the State, it seems worth while to present the list at this time. Many additional species will doubtless be found by more thorough collecting, especially in the region of the Missouri River.

From the wasps thus far collected, five new species have been described as follows:

Cerceris dakotensis Banks—Can. Ent., vol. 47, p. 402, 1915.

Cerceris stigmosalis Banks—Ent. News, vol. 27, p. 64, 1916.

Xylocelia striata Mickel—Ann. Ent. Soc. Am., vol. 9, p. 350, 1916.

Thyreopus knoxensis Mickel—Trans. Am. Ent. Soc., vol. 42, p. 424, 1916.

Crabro proletarius Mickel—Trans. Am. Ent. Soc., vol. 42, p. 426, 1916.

The identifications of the Sphecidae are by Dr. H. T. Fernald, the Psammocharidae and Philanthidae by Mr. Nathan Banks, the Bembecidae in part by Dr. J. B. Parker; all others by Mr. C. E. Mickel, excepting the Vespidae, for which the writer is responsible, and the genus *Mimesa*. I am also greatly indebted to Mr. Mickel for revising the arrangement and nomenclature of the list.

Family MUTILIDAE.

Dasymutilla bioculata (Cress.). Bismarck; one male, July 8, on flowers of *Sium cicutaefolium*.

Dasymutilla canella (Blake). Minot; one male, Aug. 22.

Family SCOLIIDAE.

Tiphia sp. (*inornatus* Say ?). Bismarck; four, July 8, on flowers of *Sium cicutaefolium*.

Family SAPYGIDAE.

Eusapyga sp. Williston; Aug. 14; two at clay bank where bees were nesting (*Anthophora* and *Osmia*).

Family VESPIDAE.

Vespa arenaria Fab. (*V. consobrina* Sauss.). Fargo; one worker. Sept. 4, 1915.

Vespa diabolica Sauss. Fargo; several, at flowers of *Aster paniculatus*, *Clematis virginiana*, *Melilotus alba*, *Salix* sp., *Solidago canadensis*, *S. rigida*. Also from Lake Park, Minnesota, (C. H. Waldron) on *Impatiens biflora* and *Scrophularia leporella*. This is the most common hornet in this locality. I have seen a nest in a tree and several under the eaves of houses in the city. One of the latter removed after dark, Aug. 25, contained over 600 adults and must have had two or three times as many larvae and pupae.

Vespa maculata Linn. Fargo; four males, one on *Aster paniculatus*. Also from Lake Park, Minnesota (C. H. Waldron), on *Eupatorium perfoliatum* and *Impatiens biflora*.

Vespa vulgaris Linn. Fargo; 3 queens, one male, one on *Salix* sp. Also from Lake Park, Minnesota, (C. H. Waldron) on *Impatiens biflora*.

I have also a worker of *V. vidua* Sauss. from Lake Park, Minnesota, (C. H. Waldron) on *Impatiens biflora*. This locality while only 40 miles from Fargo is at the edge of the lake and forest region, and may be the western limit of many insects as it is of plants.

Polistes sp. Fargo (in one of the college buildings), Medora, Sentinel Butte, Mott (J. R. Campbell); on *Aster* sp., *Solidago rigida* and *Vagnera stellata*. On Aug. 30, 1914. I found queens fairly common at Medora; otherwise these wasps have seemed very rare here and I have not seen a nest.

Family PSAMMOCHARIDAE.

Ceropales fraternus F. Sm. Fargo, Bismarck, Schafer; July 8 to Sept. 6, on *Melilotus alba*, *Sium cicutaefolium* and *Solidago canadensis*.

Cryptochelus terminalis Say. Williston, one, Aug. 14. *Medicago sativa* (not tripping the flowers).

Psammochares arctus (Cress.) Fargo; one, June 15, on *Zizia aurea* (C. H. Waldron).

Psammochares illinoensis (Rob.). Fargo; one, September 10, on *Aster paniculatus*.

Family SPHECIDAE.

Chlorion (*Palmodes*) *laeviventris* (Cress.). Williston; one female, Aug. 15, on *Melilotus officinalis*.

Chlorion (*Priononyx*) *atratum* (Lep.). Steele; one male, July 14, on *Carduus undulatus*; Mott (J. R. Campbell); one female, Aug. 20, on *Solidago rigida*.

Chlorion (Isodontia) elegans (F. Sm.). Williston; one, August 8, at clay bank.

Psammophila violaceipennis (Lep.). Fargo, Monango; July 2 to Sept. 15; on *Aster multiflorus*, *Amorpha canescens*, *Lactuca pulchella* and *Solidago serotina*.

Psammophila luctuosa (F. Sm.). Dickinson (C. H. Waldron); one female, May 25, on *Malus malus*.

Several other specimens have not been determined definitely.

Family STIZIDAE.

Stizus unicinctus Say. Williston; one male, August 15, on *Kuhnistera oligophylla*.

Family NYSSONIDAE.

Astatus nebeculus Cress. Williston; one female, August 8, at clay bank.

Nysson lateralis Pack. Bismarck; one male, July 8, on *Sium cicutaefolium*.

Hoplitus albosignatus (Fox). Fargo (C. H. Waldron); one female, June 15, on *Zizia aurea*.

Hoplitus atrifrons (Fox). Fargo; four males, June 16, on *Zizia aurea*.

Hoplitus nebulosus (Pack.), Valley City; one female, August 13, on *Helianthus maximiliani*.

Pseudoplatus phaleratus (Say). Fargo; two males, July 29 and Aug. 21, on *Solidago serotina*.

Family PHILANTHIDAE.

Sub-family Philanthinae.

Philanthus solvivagus Cress. Sheldon, Medora, Mott (J. R. Campbell); Aug. 12 and 30, on *Solidago canadensis* and *S. rigida*.

Philanthus albipilosus Cress. Williston, Sheldon; many specimens; Aug. 8 and 12; on *Helianthus maximiliani*, *H. petiolaris*, *Kuhnistera villosa* and *Solidago serotina*.

Philanthus lepidus Cress. Fargo, Bismarck, Valley City; July 8 to Aug. 10, on *Aster salicifolius*, *Lactuca pulchella*, *Melilotus alba*, *Physostegia parviflora*, *Sium cicutaefolium*, *Solidago serotina* and *Symporicarpos occidentalis*.

Philanthus pacificus Cress. Sheldon; August 12; two on *Kuhnistera villosa*.

Philanthus flavifrons Cress. Williston, Minot; August 15 and 22; several on *Grindelia squarrosa* and *Kuhnistera oligophylla*.

Philanthus vertilabris Dahlb. Williston; one, August 15, on *Kuhnistera oligophylla*.

Ococetes basilaris (Cress.). Medora; several, August 30, on *Solidago rigida*.

Ococetes sanbornii (Cress.). (*Ph. trumanii* Dunn). Williston; one, Aug. 15, on *Kuhnistera oligophylla*.

Aphilanthops frigidus Sm. Sheldon; August 12, one specimen.

Aphilanthops subfrigidus Cress. Bismarck; one, July 8, on *Sium cicutaefolium*.

Sub-family Cercerinae.

Cerceris chrysippe Banks. Fargo; four, August 2 and 10, on *Solidago serotina*.

- Cerceris dentifrons* Cress. Fargo (C. H. Waldron); one, August 19, on *Solidago rigida*.
Cerceris deserta Say. Fargo, Pleasant Lake, Mott (J. R. Campbell); four, July 31 to Aug. 31, on *Solidago canadensis* and *S. serotina*.
Cerceris occipitomaculata Pack. Williston; three, August 15, on *Kuhnistera oligophylla*.
Cerceris dakotensis Banks. Fargo; six, July 7 to September 6, on *Melilotus alba*, *Solidago canadensis* and *S. serotina*.
Cerceris nigrescens F. Sm. Fargo, Valley City, Bismarck, Mylo; June 29 to July 21, on *Sium cicutaefolium*, *Syphoricarpos occidentalis* and *Zizia aurea*.
Cerceris stigmosalis Banks. Fargo; one, September 4, on *Solidago canadensis*.
Cerceris halone Banks. Fargo; four, July 31 and August 2, on *Solidago serotina*.
Cerceris fulvipediculata Schlet. Fargo, Monango, Granville; July 3 to Aug. 24, on *Amorpha canescens*, *Melilotus alba* and *Kuhnistera oligophylla*.
Cerceris rufinoda Cress. Bismarck; one, July 8, on *Sium cicutaefolium*.
Cerceris rufinoda crucis Vier. & Ckll. Williston, Minot; two, Aug. 15 and 22, on *Kuhnistera oligophylla*.
Cerceris finitima Cress. Minot; one, August 22, on *Kuhnistera oligophylla*.
Eucerceris bicolor Cress. Minot; four, August 22, on *Kuhnistera oligophylla*.
Eucerceris fulvipes Cress. Bismarck; one, July 8, on *Sium cicutaefolium*.
Eucerceris superba Cress. Williston, Minot; several, August 15 and 22, on *Kuhnistera oligophylla*.

Family LARRIDAE.

- Tachysphex tarsatus* (Say). Sheldon; one female, August 12.
Tachysphex fusus Fox. Dickinson; one male, July 4.
Tachysphex mundus Fox. Bismarck; one female, July 8, on *Sium cicutaefolium*.
Tachysphex tenuipunctus Fox. Fargo; one female, August 26, on *Solidago canadensis*.
Tachytes pepticus (Say). Williston, Minot; three, August 15 and 22, on *Kuhnistera oligophylla*.

Family BEMBICIDAE.

- Stictiella emarginata* (Cress). Williston; one female, August 15, on *Kuhnistera oligophylla*.
Bicyrtes ventralis (Say). Medora, Williston; four, August 8 and 30, on *Helianthus petiolaris*, *Solidago rigida* and *S. serotina*.
Bembix sayi Cress. Dickinson, July 28 (C. H. Waldron); Sheldon, Aug. 12, on *Kuhnistera villosa*.
Bembix spinolae Lep. Fargo, Sheldon, Mott (J. R. Campbell); July 11 to Sept. 15, on *Aster multiflorus*, *A. paniculatus*, *Centaurea jacea*, *Grindelia squarrosa*, *Solidago canadensis*, *S. rigida*. Also from Lake Park, Minnesota (C. H. Waldron), on *Eupatorium perfoliatum*.
Microbembex monodonta (Say). Sheldon; three females, Aug. 12.

Family PSENIDAE.

Mimesa mixta (Fox.) (det. Regan.) Lisbon; one male, June 5, on *Hydrophyllum virginicum*.

Mimesa pauper Pack. (det. Regan.) Knox, two, July 13, on *Sium cicutaeformis*.

Xylocelia striata Mickel. Dickinson; one female, July 4.

Cemonus inornatus (Say). Fargo; three males, June 13 and 15, on *Zizia aurea*.

Family CRABRONIDAE.

Thyreopus tenuiglossis (Pack.). Fargo; two females, August 15, on *Aster paniculatus*.

Thyreopus knoxensis Mickel. Knox; one male, July 13, on *Sium cicutaeformis*.

Crabro rufifemur Pack. Fargo, Monango; several, July 3 to September 1, on *Lactuca pulchella*, *Melilotus alba*, *Solidago canadensis* and *Symphoricarpos occidentalis*.

Crabro dilectus Cress. Mott (J. R. Campbell); three, August 20, on *Solidago mollis*.

Crabro gracilissimus Pack. Fargo; one male, June 13, on *Zizia aurea*.

Crabro sexmaculatus Say. Fargo, Lisbon; four, June 5 and 13, on *Zizia aurea*.

Crabro heraclei Rohwer. Lisbon; one male, June 5, on *Hydrophyllum virginicum*.

Crabro protelarius Mickel. Lisbon; one male, June 5, on *Hydrophyllum virginicum*.

Crabro chrysargyrus Lep. Fargo; several, June 19 to August 13, on *Aster multiflorus*, *Solidago canadensis* and *Zizia aurea*.

Crabro maculatus (Fab.). Fargo; several, June 29 to August 1, on *Clematis virginiana* and *Solidago serotina*.

Crabro montanus Cress. Fargo, Lisbon; two females, June 5 and 20, on *Heracleum lanatum* and *Zizia aurea*.

Crabro producticollis Pack. Fargo; a female, July 29, on *Clematis virginiana*; two males July 31, on *Solidago serotina*.

Crabro interruptus (Lep.). Fargo, Mylo; many, July 7 to September 6, on *Melilotus alba*, *Solidago canadensis*, *S. rigida*, *S. serotina*, *Symphoricarpos occidentalis* and *Zizia aurea*.

Family OXYBELIDAE.

Notoglossa emarginata (Say). Pleasant Lake; a pair, August 11, on *Solidago canadensis*.

Oxybelus subulatus Rob. Monango, Granville; four, July 3 and 8, on *Amorpha canescens* and *Kuhniastera oligophylla*. Two from Fargo (Nos. 2068 and 2083) are tentatively referred here; also one from Minot (9337).

Oxybelus quadrinotatus Rob. Fargo, Valley City, Lisbon, Pleasant Lake, Dickinson; many, June 5 to August 19, on *Apocynum hypericifolium*, *Helianthus petiolaris*, *Melilotus alba*, *Solidago canadensis*, *S. rigida* and *Zizia aurea*.

Oxybelus quadrinotatus montanus Rob. Medora; one female, August 30, on *Solidago rigida*.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., NOVEMBER, 1917.

The News for 1918.

The flag of the News has been kept flying during the year 1917 as our editorial for January last announced that it would be. In spite of the increased costs we shall issue twenty-eight plates for 1918, as compared with 25 in 1916, 20 in 1915 and 18 in 1914. That this has been accomplished is, of course, in large measure due to the co-operation of authors who have borne part of the expense. The present number and that for December will comprise the usual number of pages, bringing the total for the year to 480, exclusive of the index, title-page, etc.

It would be idle, however, to pretend that the News can remain unaffected by the present great economic changes of the world, or that it can be independent of the increasing costs of production of almost all things. We therefore find ourselves temporarily compelled to reduce our pages to 40 per issue for 1918 and to bear the expense of but one plate of line-engravings per month. Illustrations requiring half-tone reproduction, or more than one plate of line-engravings per article, can only be published at the author's expense and the costs of such have already become greater than those announced for 1917 on the second page of our cover. Articles accompanied by single plates of line-engravings reproduced at the expense of the News will in consequence "wait their turn" to appear in order of acceptance.

As soon as conditions improve sufficiently we will restore the News to its present dimensions. The subscription price for 1918 will be as at present.

We bespeak the continued support of all our old friends and the financial aid of those who, associated with institutions subscribing to the News, are not themselves subscribers, although often enjoying the hospitality of our pages.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS
OF THE GLOBE.

Abundance of the Fall Web Worm. (Lepid.)

In June [1917], members of the entomological force at Audubon Park, New Orleans, noticed many webs and larvae of the fall web worm (*Hyphantria textor*) on willows, mulberries, osage oranges and other trees in the vicinity of the city—across the Mississippi River southwest of Marerro (formerly Amesville) on the road to Shell Beach, near Hahnville and other points on the Texas and Pacific Ry., and on the road to West End. During the latter part of the week of July 8th, the business section of New Orleans was invaded by myriads of the small white moths of this species. On the morning of Friday, July 13th, when they were most numerous, they were observed in great numbers resting on buildings and telephone poles. The appearance of poles and other objects in the early morning was as if they had received a thorough coat of whitewash. The tops of several large hotels and department store buildings in New Orleans are illuminated nightly by rows of electric lights, and these, together with the street lights and electric signs of the business section, produce a radiance against the sky which can be seen for a long distance. It is evident that a large proportion of the moths flew past or above hundreds of ordinary street lights to reach the brilliant illumination of Canal Street. Eggs have since been taken on sycamore, and extraordinary numbers of larvae were observed on August 7 on mulberry, willow, palms, rose bushes and bananas in the city, as well as crawling over a house.—T. E. HOLLOWAY, in Reps. Nos. 4 and 5, Emergency Entom. Service, U. S. Dept. Agr., Aug. 1 and Sept. 1, 1917.

The Entomological Collections of the University of Michigan.

The report of the Director of the Museum of Zoology of the University for July 1, 1916, to June 30, 1917, dated October, 1917, has just appeared. Special prominence is given to the report on the Division of Entomology by F. M. Gaige, Scientific Assistant in Charge of Insects. To meet its relations to the public, the department of zoölogy of the University, other institutions and independent scientific workers, the Division is endeavoring to acquire with the greatest expedition an elaborate collection of Michigan insects for general reference, for public exhibition, for loan to educational institutions and for intensive study. Co-operation with naturalists in Michigan and neighboring States has been sought; Dr. W. W. Newcomb has been made Honorary Curator of Lepidoptera, Mr. E. B. Williamson, Honorary Curator of Odonata and Mr. A. W. Andrews, Associate Curator

of Coleoptera. Considerable assistance has also been received from Messrs. A. F. Combs and W. MacAlpine. The most noteworthy recent additions to the collections are: Very large collections of Michigan Coleoptera; large numbers of Michigan Lepidoptera, Odonata and Diptera; of Formicidae (which Mr. Gaige is studying intensively) from Colombia, British Guiana, the Windward Islands, Michigan, Texas and Nevada; some 50,000 Philippine insects of nearly all orders from Prof. E. M. Ledyard, but little of this last material has been determined except the Lepidoptera. The mounted collection is in 220 Schmidt boxes (in metal cabinets of the Skinner type) and 125 Comstock boxes (in whitewood cabinets).

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded.

The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new species are all grouped at the end of each Order of which they treat. Unless mentioned in the title, the number of the new species occurring north of Mexico is given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

- 4—The Canadian Entomologist. 5—Psyche. 6—Journal, New York Entomological Society. 8—The Entomologist's Monthly Magazine, London. 9—The Entomologist, London. 10—Nature, London. 12—Comptes Rendus, L'Academie des Sciences, Paris. 21—The Entomologist's Record, London. 50—Proceedings, U. S. National Museum. 68—Science, New York. 75—Annual Report, Entomological Society of Ontario, Toronto. 131—Proceedings, South London Entomological and Natural History Society. 179—Journal of Economic Entomology. 180—Annals, Entomological Society of America. 181—Guide to Nature, Sound Beach, Conn. 184—Journal of Experimental Zoology, Philadelphia. 206—The Scottish Naturalist, Edinburgh. 217—Bulletin, Societe Entomologique d'Egypte. 238—Anales, Sociedad Cientifica Argentina, Buenos Aires. 240—Maine Agricultural Experiment Station, Orono. 259—Publications, Carnegie Institution of Washington. 285—Nature Study Review, Ithaca, N. Y. 322—Journal of Morphology, Philadelphia. 344—U. S. Department of Agriculture, Washington, D. C. 406—Boletin del Museo Nacional de Chile, Santiago de Chile.

407—Journal of Genetics, Cambridge, England. **447**—Journal of Agricultural Research, Washington. **480**—The Annals of Applied Biology. **531**—Boletin, Dirección de Estudios Biológicos, Mexico. **532**—Proceedings, National Academy of Sciences of the United States of America, Washington. **540**—The Lepidopterist. Official Bulletin, Boston Entomological Club. **543**—Genetics, Princeton, N. J. **550**—Occasional Papers, Boston Society of Natural History.

GENERAL SUBJECT. Brown, T. N.—Personal notice by R. C. Miller, **181**, x, 153-5. Burge, W. E.—The catalase content of luminous and non-luminous insects compared, **68**, xlvi, 295. Chapman, T. A.—An instance of a double pupal skin; Injury to pupa and malformation of imago, **8**, 1917, 196-7; 216. Doane, R. W.—Effect of smelter gases on insects, **68**, xlvi, 295-6. Gates, F. C.—Synchronism in the flashing of fire flies, **68**, xlvi, 314. Harvey, E. N.—The chemistry of light-production in luminous organisms, **259**, No. 251, 171-234. Herrera, M.—Insectos homocromicos y mimeticos mexicanos, **531**, ii, 83-91. Huie, L. H.—Some notes on the microscopical preparation of insects, **206**, 1917, 219-229. Lyle, G. T.—On the cocoon colour of various insects, **9**, 1917, 153-4. Silva, F.—Informe del jefe de la sección de Aracnología e insectos daninos, **406**, vii, 158-93. Slosson, A. T.—A few memories. II, **6**, xxv, 93-7.

PHYSIOLOGY AND EMBRYOLOGY. Holt, C. M.—Multiple complexes in the alimentary tract of *Culex pipiens*, **322**, xxix, 607-27. Lankester, E. R.—The terminology of parthenogenesis, **10**, cix, 504-5. Lecaillon, A.—Sur la signification des changements de couleur qui se produisent normalement dans certains œufs non fécondes de *Bombyx mori* . . . **12**, 1917, 192-4. Lockhead, W.—Insects as material for studies in heredity, **75**, 1916, 66-72. McClung, C. E.—The multiple chromosomes of *Hesperotettix* and *Mermiria*, **322**, xxix, 519-608. May, H. G.—The appearance of reverse mutations in the bar-eyed race of *Drosophila* under experimental control, **532**, iii, 544-5. Plough, H. H.—The effect of temperature on linkage in the second chromosome of *Drosophila*, **532**, iii, 553-5. Shull, A. F.—Sex determination in *Anthothrips verbasci*, **543**, ii, 480-8. Sturtevant, A. H.—Genetic factors affecting the strength of linkage in *Drosophila*, **532**, iii, 555-58. Wenrich, D. H.—Synapsis and chromosome organization in *Chorthippus curtipennis* and *Trimerotropis suffusa*, **322**, xxix, 471-518.

MEDICAL. Howard, L. O.—The relation of insects to disease in man and animals, **75**, 1916, 57-62.

ARACHNIDA, ETC. Aragas, H. de B.—Ixodidas. Comissão de Linhas Telegraphicas Estratégicas de Matto-Grosso ao Amazonas (Pub. No. 36, 19 pp.). Eales, N. B.—The life history and

economy of the cheese mites, 480, iv, 28-35. Herms, W. B.—Contribution to the life-history and habits of the spinose ear-tick, *Ornithodoros megnini*, 179, x, 407-11.

NEUROPTERA, ETC. Folsom, J. W.—North American collembolous insects of the subfamily Onychiurinae [many new], 50, iii, 637-59. McGregor, E. A.—Eight new Mallophaga of the genus *Lipeurus* from N. American birds [8 new], 5, 1917, 106-17.

HEMIPTERA. Barber, H. G.—Synoptic key to the Lygaeidae of the U. S., 5, 1917, 128-35. Dickerson, E. L.—Notes on *Leptobyrsa rhododendri*, 6, xxv, 105-12. Fenton, F. A.—Observations on *Lecanium corni* and *Physokermes piceae*, 4, 1917, 309-20. Green, E. E.—A list of Coccidae affecting various genera of plants, 480, iv, 75-89 (cont.). Hollinger, A. H.—Taxonomic value of antennal segments of certain Coccidae, 180, x, 264-78. Hungerford, H. G.—Life history of a boatman, 6, xxv, 112-22. Parshley, H. M.—Fauna of New England, XIV.—List of the Hemiptera-Heteroptera, 550, vii, 119 pp.

Baker, D. C.—Eastern aphids, new or little known [6 new], 179, x, 420-33. Patch, E. M.—Eastern aphids, new or little known, Part I [4 new], 179, x, 416-20.

LEPIDOPTERA. Adkin, R.—The resting habits of white butterflies, 9, 1917, 191. *Ocneria dispar* in Britain, 131, 1916-17, 1-6. Baird, A. B.—An historical account of the forest-tent-caterpillar and of the fall-webworm in N. America, 75, 1916, 73-87. Braun, A. F.—Observations on the pupal wings of *Nepticula*, with comparative notes on other genera, 180, x, 233-9. Chapman, T. A.—The genus *Hesperia*, 21, 1917, 141-5 (cont.). Comstock, A. B.—The common butterflies, 285, xiii, 217-243. Dolley, W. L.—The rate of locomotion in *Vanessa antiopa* in . . different illuminations, 184, xxiii, 507-18. Figuero, C. S.—Algunas observaciones sobre la variacion entre los L. Chilenos, 406, ix, 54-64. Fountaine, M. E.—List of butterflies taken in the neighbourhood of Los Angeles, Cal., 9, 1917, 154-6. Hall, A.—New butterflies of the family Nymphalidae, 9, 1917, 161-3 (cont.). Harrison, J. W. H.—Studies in the hybrid *Bistoninae*, II, 407, vi, 269-313. Hess, H. M.—Color key to the common butterflies, 285, xiii, 244-51. Mosher, E.—Pupae of some Maine species of Notodontoidae, 240, Bul. 259. Reiff & Cassino—Two weeks at Rockledge, Fla., 540, i, 75-8 (cont.). Shufeldt, R. W.—Some familiar butterflies, 285, xiii, 255-60. Tarbat, J. E.—Preponderance of the female sex in L., 9, 1917, 190. Turner, H. J.—The genus *Pararge*, 131, 1916-17, 7-17. Wickwire, H. A.—Some disguises of the mourning-cloak, 285, xiii, 252-3. Willcocks, F. C.—A

sound produced by the larva of the death's-head moth, 217, 1916, 100-1.

Barnes & McDunnough—A new Canadian Noctuid, 4, 1917, 320-1. Cassino, S. E.—A new form of *Catocala ultronia*, 540, i, 79-80. Swett, L. W.—Geometrid notes [1 n. name], 540, i, 78-9. Wright, W. S.—Notes and descriptions of Geometridae [3 new], 6, xxv, 123-5.

DIPTERA. Figueroa, C. S.—Contribucion al conocimiento de la familia Phoridae en Chile, 406, ix, 5-21. Townsend, C. H. T.—The head and throat bots of American game animals, 6, xxv, 98-105.

Banks, N.—Notes on some n. sps. of the genus *Dioctria* [6 new], 5, 1917, 117-19. Greene, C. T.—Two new cambium miners, 447, x, 313-17.

COLEOPTERA. Brethes, J.—Description d'un nouveau genre et d'une nouvelle espece de Ptiliidae du Chili, 406, vii, 278-9. Burgess & Collins—The genus *Calosoma*: including studies of seasonal habits, etc., 344, Bul. 417. Davis, W. T.—*Ammodonus fossor* on Staten Island, 6, xxv, 126-7. Harvey, E. N.—What substance is the source of the light in the firefly, 68, xlvi, 241-3. Hyslop, J. A.—The phylogeny of the Elateridae based on larval characters, 180, x, 241-63. Leng, C. W.—*Syncalypta spinosa* in N. America, 6, xxv, 128-9. Main, H.—On rearing beetles of the genus *Geotrupes*, 181, 1916-17, 18-22. Winn, A. F.—Note on *Physonota unipuncta*, 75, 1916, 50-1.

Chamberlin, W. J.—An annotated list of the scolytid beetles of Oregon [2 new], 4, 1917, 321-28. Schaeffer, C.—On some N. American Cleridae [6 new], 6, xxv, 129-34.

HYMENOPTERA. Allard, H. A.—A unique hornet's nest, 68, xlvi, 313-4. Bruch, C.—Costumbres y nidos de hormigas, 238, lxxxiii, 302-16. Cockerell, T. D. A.—New social bees, 5, 1917, 120-8. Frison, T. H.—Notes on Bombidae, and on the life history of *Bombus auricomus*, 180, x, 277-86. Gahan & Rohwer—Lectotypes of the species of *H.* described by Abbe Provancher, 4, 1917, 298-308 (cont.). Nelson, J. A.—The relation of the malpighian tubules of the hind intestine in the honeybee larva, 68, xlvi, 343-5. Rockwood, L. P.—An aphis parasite feeding at puncture holes made by the ovipositor, 179, x, 415.

Cushman, R. A.—Eight new sps. of reared ichneumon flies with notes on some others; A revision of hymenopterous insects of the tribe Cremastini of America, north of Mexico [many new], 50, liii, 457-469, 503-51. Girault, A. A.—Notes and descriptions of miscellaneous chalcid-flies [12 new], 50, liii, 445-50.

THE BLATTIDAE OF NORTH AMERICA NORTH OF THE MEXICAN BOUNDARY.

By MORGAN HEBARD. Memoirs of the American Entomological Society, No. 2, pp. 284, pls. x.

For many years systematic knowledge of our cockroaches has been a reproach to American entomologists, a condition which has been due largely to scantiness and random character of material, unattractiveness of subject and lack of economic importance except of a few species. This work by Mr. Hebard will go far to remedy this condition.

Over 5350 specimens, in large part of original gathering, and comprising also the historical material from the largest American collections, has been studied in preparation of this paper, which, through its careful and critical treatment, supplies a firm basis for further work. It was inevitable, under the preceding chaotic conditions, the relation of winged and wingless forms often being unknown, that many names should be synonymous. *Platamodes*, *Temnopteryx* and *Ischnoptera* have long proved stumbling-blocks to the would-be identifier of our native wild roaches. At last some of the doubtful points of identity and nomenclature relating to these genera may be considered settled.

Not only have large series of native species been studied but also extensive extra-limital and exotic collections for their bearing on the forms and characters presented by our own; and several short papers on portions of the group have been published during the preparation of this work. Attention is wisely directed herein, both under generic and specific heads, primarily to those features proved to be of real diagnostic value, their comparative importance differing in different groups; also to the range of variation presented in each species. The genitalia of the male, relatively inaccessible and in consequence long neglected, have been examined and proved to possess valuable specific characters. Keys for the identification of both males and females of the native and the established exotic species are furnished; as these will doubtless be used by novices as well as by experienced entomologists, an additional one for distinguishing the sexes might well have been added.

Forty-three species and one geographic race are treated, of which ten are probably established exotic adventives of domiciliary character. A supplementary section is devoted to a discussion of adventive material; this treats of 141 specimens representing 31 species of accidental occurrence beyond the normal limits of their range. Of these 8 are native to the southern United States. Probably the importation of tropical fruit is responsible for the great majority of the occurrences, which are recorded from as far inland as Ontario, Wisconsin, Iowa, Nebraska, Idaho and Utah. An interesting question is raised in reference to the possible parthenogenetic character in America of one of these, *Pycnoscelus surinamensis*, of which nearly 400 females have been captured but no males.

The paper is well illustrated by a text figure explanatory of venation, and 190 pen drawings on ten plates representing dorsal aspects and diagnostic details.

We congratulate Mr. Hebard and the American Entomological Society on the high quality of this second number of the Memoirs and hope for many more.—A. P. MORSE.

Doings of Societies.

Entomological Section of The Academy of Natural Sciences of Philadelphia.

Meeting of May 24, 1917, Director Philip Laurent presiding. Ten persons present. Mr. C. W. Frost was elected a member.

Hymenoptera.—Mr. Cushman made a few remarks on his work in the Ichneumonidae, especially the Pimplini, citing instances of the multiplicity of names given to generically doubtful species.

Orthoptera.—Some remarks were given on *Mermaria bivittata* Serville, by Mr. Rehn, showing how he established that species as distinct from a very closely allied form.

Lepidoptera.—Mr. Laurent commented on the several recent checklists of the Lepidoptera, especially on the difficulty of finding the same species in each. He called attention to the excellent list by the Ornithologists' Union and cited instances of its superiority over those in Lepidoptera in the method used in referring to the order lists. Mr. Williams spoke of the number of species in the Rhopalocera which have been placed in the synonymy, evidently showing that the intermediates of many species have been described as distinct species.—E. T. CRESSON, JR., *Recorder*.

The Entomological Society of Nova Scotia.

The Entomological Society of Nova Scotia is now in the second year of its existence and has issued its second annual report. The Society solicits the support of the nature student, the farmer, the fruit grower, the health officer and all those interested in any phase of insect life. If the proper support is forthcoming, we will be able to publish a larger, better and more comprehensive report, that will appeal to all classes of citizens. At present the entire cost of publication is met by the government, but hereafter all funds not otherwise utilized will be applied to the printing of suitable illustrations in order to make the report more attractive and valuable to the general reader. The subscription fee, payable to the undersigned, is \$1.00 per year. This entitles the member to the annual report of this society, to the annual

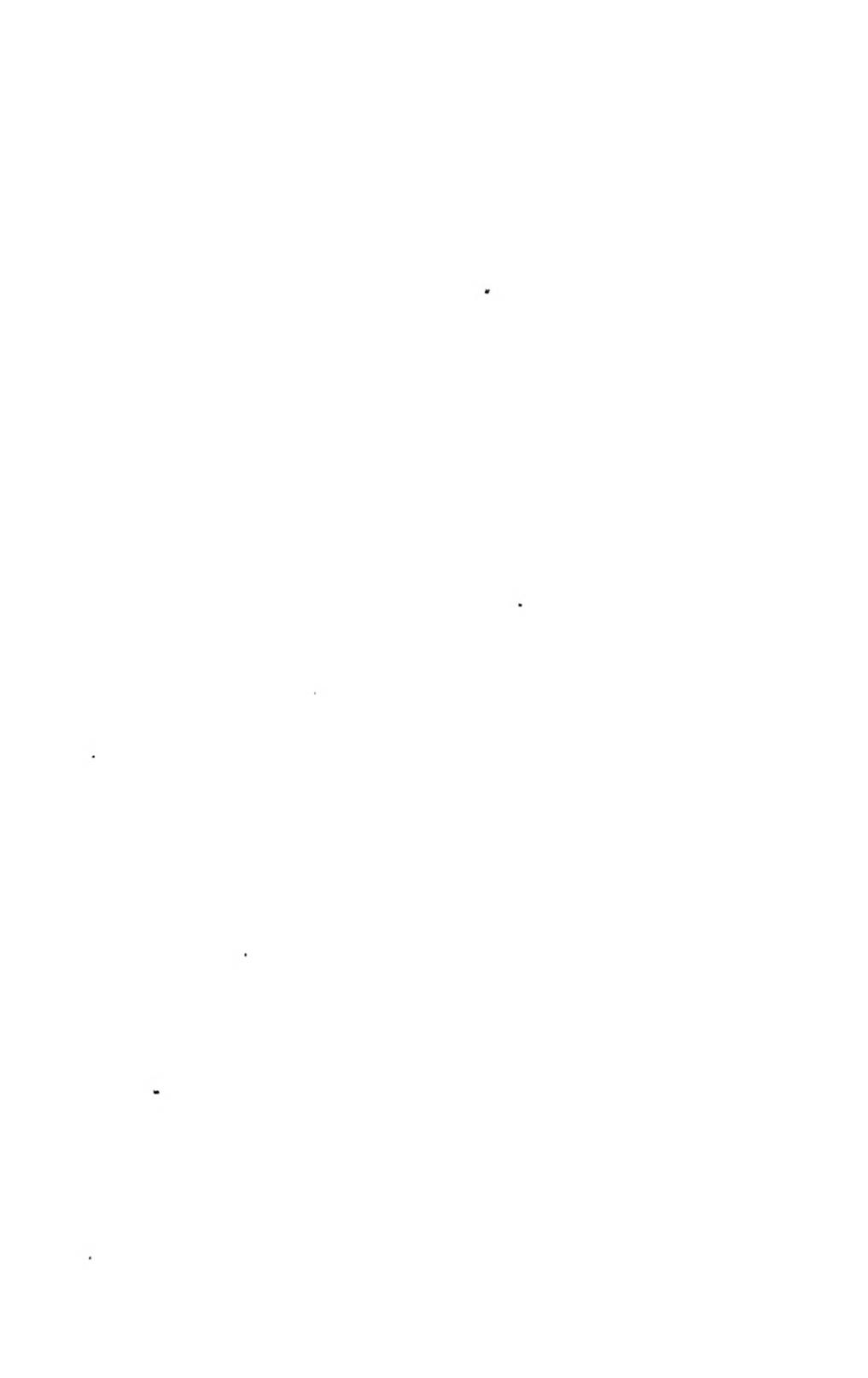
report of the Entomological Society of Ontario and to the entomological publications of the provincial and Dominion Departments of Agriculture. There is also available to professional entomologists or to all who desire it, the "Canadian Entomologist," a technical publication of interest to entomologists only. New members should state whether or not they desire this monthly. All those who wish to receive copies of entomological bulletins, kindly inform the undersigned, and those whose address is incomplete or incorrect will confer a favor by informing us of the same.—W. H. BRITTAI^N, *Secretary-Treasurer*, Dept. of Agriculture, Truro, Nova Scotia.

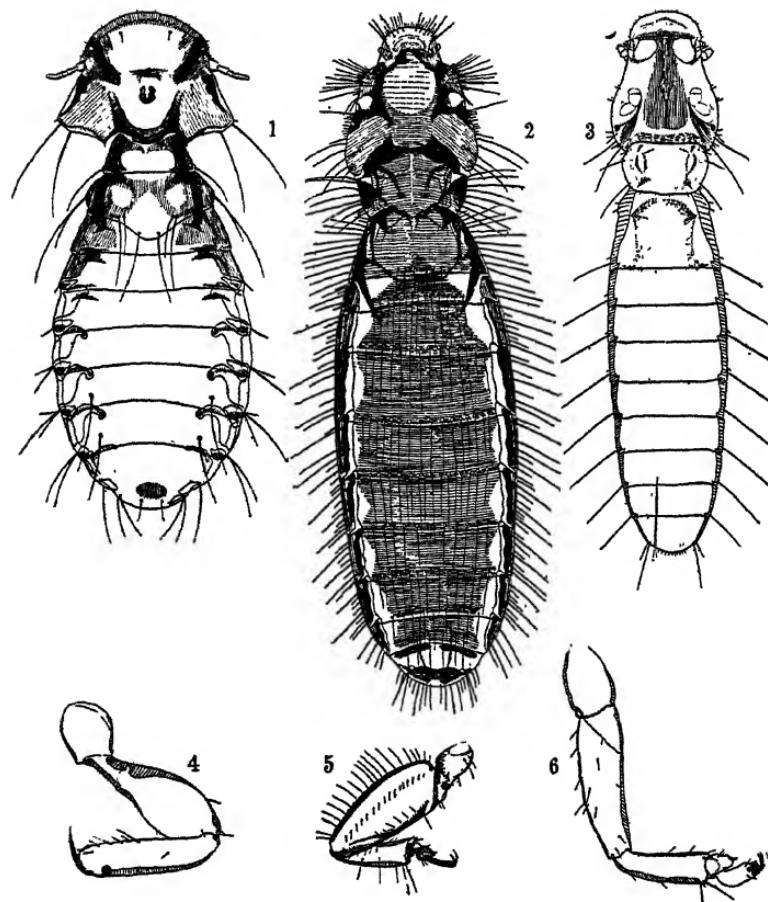
Entomological Section of the Lorquin Natural History Club.

Several enthusiastic Entomologists of the Lorquin Natural History Club, of Los Angeles, California, realizing the need of an organized association for the promotion of Entomology in Southern California, have recently formed an Entomological section of the club. The first meeting was held in the public library on September 15th, 1917. Plans for the section were discussed, and as the several speakers gave their views on the subject it became more and more apparent that an enormous amount of work is still to be done in this section of the country. In fact, Southern California is still a virgin field for the study and classification of insects. The life of Pierre Joseph Lorquin, a pioneer California naturalist, in whose honor the Club is named, was read. Dr. J. A. Comstock was elected Chairman of the section and Mr. Raoul M. May was elected Secretary. Fourteen persons were present at the first meeting. The section meets the third Saturday evening of each month in the public library. All entomologists are invited to be present.—RAOUL M. MAY, *Secretary*, 2202 W. 10th St., Los Angeles, California.

The Florida Entomological Society and its New Organ.

This Society, organized January 5, 1916, as noticed in the News, volume xxvii, page 133, decided at its April, 1917, meeting to publish a quarterly, entitled "The Florida Buggist," two numbers of which have now appeared dated June 21 and September 21, respectively. The Editor is Prof J. R. Watson, Dr. E. W. Berger is Associate Editor and K. E. Bragdon, Business Manager. The Society and the Buggist are located at Gainesville. Sixty-one members are enrolled. No richer field for the cultivation of entomology than the Southeastern States exists and such a society as that of Florida ought to flourish as the White-fly, the Sweet Potato Root Weevil and the Anopheles Mosquito, which its members discuss in their new journal. May they succeed in eradicating these insect pests and their Society and Buggist widen our knowledge for many years to come!





NEW MALLOPHAGA FROM NORTH AMERICAN BIRDS.—MCGREGOR.

- 1, 4, *Goniodes senaidurae*.
2, 5, *Laemobothrium intermedium*.
3, 6, *Physostomum melospizae*.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XXVIII.

DECEMBER, 1917.

NO. 10.

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Three new Mallophaga from North American Birds.

By E. A. McGREGOR, Bureau of Entomology, United States Department of Agriculture.

(Plate XXVIII.)

Goniodes zenaidurae n. sp. (Pl. XXVIII, figs. 1, 4.)

Three females (Bishopp No. 5258) from a mourning dove, *Zenaidura macroura* (L.), Aberdeen, South Dakota, June 3, 1915, W. E. Dove, Coll.

Type No. 21606, United States National Museum.

This species is nearest *G. damicornis* N. from which it differs in the occipital outline, shape of prothorax, character of lateral abdominal plates, and the arrangement of hairs and spines.

♀. Total length 1.80 mm.; length of head .468 mm.; length of prothorax .108 mm.; length of metathorax .252 mm.; length of abdomen .972 mm.; width of head across temples .666 mm.; width of prothorax .360 mm.; width of metathorax .504 mm.; width of abdomen .765 mm.

Head about two-fifths again as broad as long; front regularly convex, with eight short prickles; antennae in a narrow, shallow emargination with second joint longest; eye not noticeable, without a prickle; from the antennal sinuses the temporal margins diverge considerably and then converge most abruptly forming prominent angles at which are located a short prickle and a long hair; between the angle and the occiput another long hair, and a prickle at the inner end of posterior temporal border; the occipital border is strongly emarginate immediately before the lateral margins of the prothorax with a resulting strong convexity between these. Head color pale; with darker, broad marginal frontal bands, produced posteriorly on each side as a much darker bar, which terminate opposite the hind borders of antennal sinuses; temporal bands interrupted across the bases of antennae but extending from the dark ocular blotches, increasingly fainter, to the temporal angles; mandibles and oesophageal sclerite amber-colored: a rather narrow, brown band along the concave and convex portions of the occipital margin; broad, conspicuous occipital bands extend nearly to the antennal bands.

Prothorax trapezoidal, with lateral margins converging somewhat anteriorly, and posterior margin nearly straight; the latero-posterior angles are narrowly truncate, and each bears a strong hair; broad, dark lateral borders. Metathorax in outline resembling an acorn cup, with posterior-lateral regions rounded, and each bearing a long and a shorter hair; posterior margin produced on abdomen as a prominently rounded lobe, and bearing a group of six strong spines; an amber-colored yoke-like blotch involves the entire segment, and a broad curving band extends along each side into the first abdominal segment. Legs very pale, with somewhat darker marginal borders.

Abdomen elliptical, widest on fourth and fifth segments; middle region of abdomen uncolored; faint lateral bands and trigger-shaped, faint lateral blotches on segments three to six, inclusive, which encroach slightly onto the segments ahead; segments two to six, inclusive, also with a tad-pole-shaped blotch at each lateral posterior angle; segment one bare of hairs; segments two and three with a prickle at each angle; segment four with two shortish hairs at angles; segment five with two spines and a long hair at each angle, and a strong hair on each side nearly half way to the middle; segment six with two strong hairs at the angles, and a strong hair on each side nearly half way to the middle; segment seven with about eight hairs along the rounded posterior margin.

Laemobothrium intermedium n. sp. (Pl. XXVIII, figs. 2, 5.)

A male and two immature specimens (McGregor No. 82, or No. 271 of the Washburn Minnesota collection) from sparrow hawk, *Falco sparverius*, and a single male (Bishopp No.

3072) from the same host, Uvalde, Texas, March 8, 1914, coll. D. C. Parman.

Type No. 21607, United States National Museum.

This species is probably referable to *Laemobothrium* on account of the presence of the prominent swellings before the eyes, the absence of motile muscular lobes on the under side of forehead, and owing to the body length exceeding 5 millimeters. On the other hand, the shape of abdomen, outline of front of head, almost entire absence of ocular emargination, and the general markings, are much more suggestive of *Physostomum*, and our species may well be the link that obliterates the present separation into the two genera. Perhaps nearest *L. laticolle* N. from *Falco subbuteo*.

♂. Total length 6.03 mm.; length of head 1.140 mm.; length of prothorax .585 mm.; length of metathorax .517 mm.; width of abdomen 3.735 mm.; width of head across temples 1.260 mm.; width of prothorax 1.057 mm.; width of metathorax 1.35 mm.; width of abdomen 1.710 mm.

Head slightly wider than long; ground color pale amber; ocular emargination almost lacking, head suddenly and greatly contracted abreast of the mandible bases, sides of forehead converging to the evenly rounded convex front; temples at first diverging slightly, and then converging to the sharply rounded occipital corners; occipital margin deeply concave with a slight median convexity; antennae concealed in fossae; labial palpi barely projecting; mandibles pale with teeth blackish; antennal fossae rimmed medially and posteriorly with heavy black borders extending inward and backward to form Y-shaped blotches; a black, cleft blotch on each side at inner angle of forehead contraction; occipital border margined with blackish brown bands which give off short rudiments of occipital bands; in front of mandibles a crescent-shaped fossa, convex anteriorly; two strong spines arise at each frontal angle between which occur about 30 hairs and prickles of various lengths, a score or more of long and short hairs arise on the lateral prominences, two weak hairs at the front of each antennal fossa, a long hair arising just over the emarginate eye, several short hairs along the anterior half of temples, a long and a short pustulated hair at the temporal angles, a long pustulated hair at the base of the temporal lobe, and three or four longish hairs along the temporal margins.

Prothorax roughly quadrangular, a sharp constriction at each anterior angle forms a sort of neck-like extension which fits into the occipital concavity; the posterior halves of the lateral margins converge quickly and end in the posterior-lateral lobes which are

formed by the deep emargination of the posterior border; two long hairs arise from the angle just behind the frontal constriction; two black blotches on the front margin, a black fleck bordering the constriction inwardly, a large black blotch just behind constriction extending to center of lateral border and is continued fainter backward and inward, a narrow, curving, underlying bar extends backward and inward from a point before the anterior lateral flecks; a pair of black anterior metathoracic blotches show plainly through the hyaline posterior-lateral lobes, and from the inner points of these, fainter bars run inward and backward, finally paralleling the median line; six long hairs occur along the anterior portions of the lateral margins and four shorter ones from the posterior lobes; a peculiar H-shaped plate involves the entire segment through the cross-bar of which a faint clear stripe intersects. Metathorax and mesothorax, which are indistinguishably fused, are continuous with the abdomen; two short spines at each anterior angle, twelve long hairs along the margin of the segment and a central transverse series of six shortish hairs; margined laterally by a dark brown border which widens greatly posteriorly; a narrow band parallels this just mediad of same; another narrow band arises inwardly on each side which runs backward and inward, and meets transversely on the first abdominal segment; from the hindmost end of the lateral border horn-like bars are projected backward onto the first and second abdominal segments. Legs concolorous with ground color and thorax, with dark marginal borders.

Abdomen narrowly elliptical, with no marginal constrictions between segments; each segment with three or four long hairs and three or four short hairs laterally; segments one to eight, inclusive, with a transverse row of long spines at the posterior margin as follows: Segment one, 14; segment two, 14; segment three, 16; segment four, 16; segment five, 10; segment six, 14; segment seven, 9; segment eight, 6; first and eighth segments the shortest; terminal segment with a marginal fringe of about 20 hairs; segment one with a median, triangular, brownish blotch whose apex invades the metathorax; remaining segments (excepting the last) each with a transverse band of same color, which are shallowly emarginate laterally, thus leaving a clear region inside the brown lateral bands which are lined within with a parallel, semi-hyaline edge.

Physostomum melospizae n. sp. (Pl. XXVIII, figs. 3, 6.)

Two females (McGregor No. 90, or No. 178 of the Washburn Minnesota collection from the song sparrow, *Melospiza melodia*, St. Anthony Park, Minnesota. Possibly nearest *P. sucinaceum* Kell. from the western flycatcher; not at all like the *Physostomum* of the golden-crowned sparrow.

Type No. 21608, United States National Museum.

♀. Total length 2.17 mm.; length of head .53 mm.; length of prothorax .20 mm.; length of metathorax .30 mm.; length of abdomen 1.15 mm.; width of head across temples .45 mm.; width of prothorax .36 mm.; width of metathorax .47 mm.; width of abdomen .50 mm.

Head a little longer than wide; front evenly rounded; and sides of forehead somewhat concave; temples converging rotundately, but produced very slightly backward with sharply rounded posterior angles; occipital margin nearly a straight line; eye with a conspicuous black fleck; palpi considerably passing the margins of head; the labral lobes quite conspicuously passing the margin of head; ground color transparent, with a large, amber-colored, urn-shaped blotch occupying center of head, at the anterior end of which occurs a straight, transverse bar of the same color; antennal fossa bordered posteriorly with a faint blotch which extends toward the occipital angles; a faint, narrow band surrounds two clear, circular areas abreast of the palpi; 12 prickles occur along the front margin, four prickles arise on each side even with the antennae; two long hairs and five short ones arise from each temporal border between the eye fleck and the occiput; a broad, pale band borders the occipital margin.

Prothorax, roughly hexagonal with rounded angles; the antero-lateral facets with a weak hair and a longer one; a long hair and a prickle at the postero-lateral angles; four prickles along the posterior border; general color of segment faint amber, with a faint, narrow band paralleling the margin, and with other faint, linear blotches. Metathorax with a slight swelling on anterior third of sides, which bear each two prickles; general color resembling that of prothorax, with a central pale bordered blotch, and pale marginal bands. Legs rather long, pale, with faint marginal bands.

Abdomen with sides very flatly convex, subparallel; a long hair on the posterior angles of segments one to seven, inclusive, and with a prickle at the angles of segments one to three, inclusive; terminal segment bluntly rounded, with four longish hairs and a fringe of ten prickles; lateral bands almost colorless.

EXPLANATION OF PLATE XXVIII.

- Fig. 1. Female of *Goniodes senaidurae* n. sp.
2. Male of *Laemobothrium intermedium* n. sp.
3. Female of *Physostomum melospisae* n. sp.
4. Left leg III of female of *Goniodes senaidurae* n. sp.
(viewed ventrally).
5. Right leg III of male of *Laemobothrium intermedium* n. sp.
(viewed ventrally).
6. Left leg III of female of *Physostomum melospisae* n. sp.
(viewed ventrally).

All figures drawn by the author with the aid of camera lucida with little attempt at restoring symmetry.

Anthocharis genutia and a new Variety (Lep.).

By HENRY SKINNER.

This pretty species was described by Fabricius in 1793 and the original description says, "Habitat in India Dom. Drury." A. G. Butler, in his Catalogue of Diurnal Lepidoptera described by Fabricius in the collection of the British Museum, gives the following: "Illinois, United States." The catalogue was prepared with the view of identifying the species of Diurnal Lepidoptera described by Fabricius, by a comparison with the original type specimens, drawings, etc. The presumption is that the type locality was Illinois. Until recently I have not seen any variation in this species from various parts of its geographical distribution. On March 12th of the present year Mr. W. J. Coxey caught two pairs at Savannah, Georgia, and presented them to The Academy of Natural Sciences of Philadelphia. In the males the orange tip is extended to the black spot in the primary wing and extends a little above it into discal cell. The upper side of the secondaries is washed with orange, from the border, for about one-eighth inch into the wing. The tips of the females are lightly washed with orange. It will be interesting to learn whether all the specimens found in the locality mentioned have the same markings. I propose the name *flavida* for the variety.

The Egg of *Byturus unicolor* Say. (Col.).

On June 7, 1917, Mr. A. B. Buchholz reported a serious outbreak of this beetle at Milton, New York. On July 3d we visited this place and found the beetles still present in considerable numbers. Some

Egg of *Byturus unicolor* Say.

of the unripe berries were already infested with the larvae and one larva was observed just entering the fruit. On careful examination of the berries both eggs and egg-shells were found.

The egg is deposited on the unripe fruit and is attached by one side to one of the pistils. Only one egg was found on a berry. The egg is 1.1 mm. in length by .4 mm. in width, elongate ovoid, dull yellowish in color with the surface very finely roughened.—C. R. CROSBY and M. D. LEONARD, Ithaca, New York.

The Genus *Harmostes* Burm. (Coreidae, Heterop.).

By EDMUND H. GIBSON, U. S. Bureau of Entomology.

The genus *Harmostes* Burm. appears to be limited in its distribution to the New World, its species being recorded only from North, Central and South America, West Indies and the Galapagos Islands. Central America is probably its region of origin as the greatest number of species is to be found there and those occurring to the extreme north and south exhibit the greatest differences in structure. The genus now contains 16 species, 8 of which are represented in North America north of Mexico.

Harmostes is the largest and principal genus of the tribe Harmostini Stål and in general its diagnostic characters are those of Harmostini. *Aufeius* Stål and *Xenogenus* Berg, the other genera of the same tribe, may be separated from *Harmostes* as follows: *Aufeius* has the abdomen swollen or extended laterally beyond the hemelytra, and *Xenogenus* has a more elongated body and ocelli elevated. The key character for separating Harmostini from the remaining tribes of the subfamily Corizinae is the posterior femora spined beneath.

In establishing a key to the species, the use of color and color markings as diagnostic characters have been eliminated and structural differences relied upon entirely; these include principally the characters of the head and its parts, pronotal margins and angles, and size. The color within a species is quite variable, as is also the size, but the latter under certain limitations may be used.

The haplotype of the genus is *H. dorsalis* Burm., 1835, but which I now deem best to place in synonymy with *serratus* Fabr., 1794. The original description of *dorsalis* Burm. (Supra brunneus fusco-striatus, subtus flavus, pronoti margine laterali lineaque media scutelli flavis; pectore linea lateralii fusca. Long. 3-3½") is so meagre in detail that it is not possible to distinguish it from several other species. I therefore place it in synonymy with the oldest described species which falls within the genus and which has the same distribution as that stated for *dorsalis*. The coloration of *serratus*

Fabr. also fits that given for *dorsalis* Burm. The specimens which I have seen labeled "dorsalis" were determined as such by the late Mr. Otto Heidemann, but I am unable to distinguish them from *serratus*. W. L. Distant* states, "I have with Stål been unable to identify this species (*dorsalis*) ; it probably represents one of the preceding Mexican species; but the description is too slight for any accurate decision."

This paper is based upon specimens in the United States National Museum which had been previously determined by Messrs. P. R. Uhler, Otto Heidemann and R. M. Reuter, also upon considerable previously undetermined material, and includes one new species the type of which is in the collection of the U. S. National Museum. I am indebted to Mr. J. R. de la Torre Bueno for the privilege of examining a small collection of specimens in this genus, representing six species.

Genus HARMOSTES Burm.

Harmostes Burm., Handbuch der Ent., 1835.

The following is a translation by the author of the original description by Burmeister:

Resembles *Corizus* Fall., Hahn, but differing from it in having hind femora with pronounced spines. Antennae two-thirds as long as body, the first joint short, stout, and the two following delicate and of equal length, the fourth shorter than the preceding one and swollen at the apex. Ocelli near eyes. Thorax with raised curved margins, also always sloping. Front legs normal, the hind legs longer, with femora very thick, under side spiny.

A redescription of the genus is not at all necessary. Dallas gives as generic characters, besides those contained in the above description: breast furrowed longitudinally for the reception of the rostrum and rostrum reaching or passing the intermediate coxae, with its third joint as long as or longer than the fourth.

Key to the Species of *Harmostes*.

- | | |
|---|----|
| 1. Lateral margins of pronotum crenulated..... | 2. |
| Lateral margins of pronotum not crenulated..... | 8. |

* Biologia Centrali-Americana, Hem. Het. Part 1, p. 168.

2. Rostrum extending beyond metasternum..... 3.
Rostrum not extending beyond metasternum..... 7.
3. Species large, 9-10 mm. long..... 4.
Species smaller, not exceeding 8 mm. long..... 5.
4. First antennal joint considerably passing apex of head, and fourth joint about twice as long as the first..... *nebulosus* Stål.
First antennal joint about reaching apex of head, and fourth joint but little longer than the first..... *formosus* Dist.
5. Second and third antennal joints equal..... *affinis* Dall.
Second antennal joint shorter than the third..... 6.
6. Posterior angles of pronotum broadly rounding..... *procerus* Berg.
Posterior angles of pronotum angular..... *prolixus* Stål.
7. Species small, not exceeding 5 mm. long..... *apicatus* Stål.
Species larger, exceeding 5 mm. long..... *serratus* Fabr.
8. Basal joint of antennae scarcely or slightly passing apex of head..... *fraterculus* Say.
Basal joint of antennae extending considerably beyond apex of head. 9.
9. Lateral angles of pronotum broadly rounded..... 10.
Lateral angles of pronotum not broadly rounded, angular..... 11.
10. Second antennal joint shorter than third..... *subrufus* Dist.
Second and third antennal joints equal..... *croceus* n. sp.
11. Species small, less than 7 mm. long..... *marmoratus* Spin.
Species larger, 7 mm. or more long..... 12.
12. Species 9 mm. long..... *raphinerus* Spin.
Species less than 9 mm. long..... 13.
13. Lateral margins of corium appearing very wide and distinctly luteous..... *bicolor* Dist.
Lateral margins of corium normal..... 14.
14. Bucculae prominent, long, not disappearing before line of the eyes..... *reflexulus* Say.
Bucculae short, disappearing before line of eyes..... *minor* Spin.

Harmostes nebulosus Stål .

Harmostes nebulosus Stål, Hem. Mexicana, p. 307, Ent. Zeit, Nos. 7-9, 1862.

Head nearly twice as long as width between eyes. First joint of antennae passing apex of head and about one-half as long as fourth joint, second shorter than third, fourth not as swollen as the first. Rostrum extending beyond metasternum with darkened apex. Bucculae very prominent and rounding anteriorly and posteriorly. Lateral margins of pronotum crenulated. Pronotum coarsely and evenly punctate, median line distinct but not greatly raised. Membrane spotted with fuscous. Hind femora greatly incrassated, spined beneath with

four large prominent spines between which are three smaller ones. Size large, 9-10 mm. long. General color above light to dark brown, varying considerably within the species. Paler beneath. Lateral margins of corium spotted with fuscous.

Occurs in Mexico, Guatemala and Salvador.

Harmostes formosus Dist.

Harmostes formosus Dist., Biol. Cent.-Amer., Hem. Het., Vol. I, p. 167, 1893.

"Head ochraceous. Antennae with the basal joint incrassate, dark ochraceous, and about reaching apex of head; second and third joints subequal in length, testaceous; apex of second joint fuscous; fourth joint short, a little longer than the first, thickened with fuscous. Pronotum ochraceous, finely punctate and obscurely wrinkled, subgranulose near anterior margin, with the lateral angles rounded and strongly reflexed; angular margins fuscous, lateral margins luteous and crenulated, anterior angles prominent; a central pale longitudinal line which is raised and levigate near anterior margin; posterior margin narrowly pale luteous. Scutellum ochraceous, with a central longitudinal line and apical margin pale luteous. Corium luteous, sparingly and finely punctate (clavus thickly so), with a large, elongated, fuscous spot on disk, a row of small fuscous spots on costal margin, and a larger spot of the same color near apical angle. Membrane pale hyaline, with obscure fuscous spots. Under side of body pale luteous, lateral margin of head and sternum strongly punctate; abdomen with a few scattered black punctures on anterior margin of disk, and stigmata black; femora luteous, with their apices, tibiae, tarsi, and rostrum testaceous. Rostrum just passing posterior coxae, with the apex pithy. Posterior femora with their apical halves strongly spined, four spines being longest, strongest, and luteous in color. Long. 9 mm., lat. pronot. ang. 3 mm."

The above is copied from the original description by Distant.

This species has been recorded only from Mexico.

Harmostes affinis Dall.

Harmostes affinis Dallas, Cat. Hem. Brit. Mus., p. 522, 1852.

Head small and strongly convex in both directions. First joint of antennae passing apex of head, second and third joints about equal in length, fourth longer than the first but not greatly swollen. Rostrum extending beyond metasternum. Lateral margins of pronotum crenulate, and with a deep but gradual curve; posterior portion of thorax prominently raised and evenly punctate. Hind femora incrassated and spined beneath. Size, rather small, about one quarter of an inch long.

General color light brown but quite variable. Scutellum and apex of corium dark. Thorax and corium spotted with small red dots. Membrane spotted with fuscous. Beneath pale, with prominent red spots well scattered; abdomen more or less mottled with fuscous.

Its range includes Southern United States, Mexico, Colombia and Paraguay.

Harmostes prolixus Stål.

Harmostes prolixus Stål, Bidrag till Rio Janeiro-Traktens. Hem. Fauna, p. 37, 1858.

Head broad, first joint of antennae passing apex of head, second shorter than third, fourth one-half longer than first joint. Rostrum extending beyond metasternum. Bucculae short, ending before line of the eyes. Eyes prominent. Lateral margins of pronotum crenulated to posterior angles. Median dorsal line almost disappearing in center of thorax. Thorax, scutellum, and corium finely and evenly punctate. Hemelytra widest at the middle. Membrane hyaline with faint fuscous spots. Hind legs with femora greatly incrassated and with three large prominent spines beneath, between which are from two to four smaller ones. Size about 7 mm. long. General color above dark brown but may vary to lighter shades. Beneath lemon yellow mottled with fuscous laterally. Posterior two-thirds of hind femora dark brown to black.

This species is reported from Rio Janeiro. I have also seen specimens from Mexico, Porto Rico and Paraguay.

Harmostes procerus Berg.

Harmostes procerus Berg, Hem. Argentina 1879, p. 91.

No specimens of this species have been examined, but by the original description it can readily be placed in the key to species and should be easily recognizable. A synopsis of the original description is here given:

Head moderately long, second joint of antennae shorter than the third, beak extending beyond the metasternum. Lateral margins of pronotum strongly crenulate, posterior angle broadly rounded. Membrane subhyaline with an obsolete median fuscous line. General color yellowish, corium tinged more or less with green. Size 5-6½ mm. long.

The most pronounced character by which the species may be separated from *H. prolixus* is the broadly rounding posterior angles of the pronotum.

Berg records its occurrence at Buenos Ayres and in Patagonia.

Harmostes apicatus Stål.*Harmostes apicatus* Stål, Freg. Eug. Resa. Ins. p. 238, 1859.

Head broad, first antennal joint considerably passing apex of head, second and third joints about equal in length, fourth slightly longer than first. Beak not extending beyond metathorax. Bucculae disappearing at line of the eyes. Lateral margins of pronotum prominently raised and crenulated. Thorax and corium coarsely punctate. Hind femora greatly incrassated and spined beneath. Size 5 mm. long. Color light brown to russet above, somewhat paler beneath. Membrane hyaline with faint fuscous spots.

Its distribution includes Chile, Paraguay, Brazil and Argentina.

Harmostes serratus Fabr.*Acanthia serratus* Fabr. Ent. System., iv., p. 75, 1794.*Harmostes perpunctatus* Dall. 1852, List Spec. Hem. Ins. Brit. Mus.

Part 2.

Coreus gravidator Fabr. Ent. System., iv., p. 133, 1794.*Harmostes dorsalis* Burm. Handbuch. der Ent. 1835.

Head long with long lateral spinous processes between eyes and antennae. First joint of antennae stout, but slightly passing apex of head, second joint shorter than third, fourth about equal to first in length. Beak not extending beyond metasternum. Bucculae not prominent, disappearing at line of eyes. Lateral margins of thorax crenulated, posterior margin wide. Pronotum, scutellum and corium coarsely punctate. Hind femora incrassated slightly before the middle making anterior portion of femora appear long. Size 7-8 mm. long.

General color above dark brown, paler beneath. Membrane hyaline with fuscous spots. Costal margin of corium pale.

The range of this species includes Brazil, Argentina, Paraguay, Galapagos Islands, West Indies, Central America and practically the entire United States.

Harmostes fraterculus Say.*Syromastes fraterculus* Say, Desc. New Spec. Het. Hem. of N. A. New Harmony, Ind., 1831, p. 324.*Harmostes fraterculus* Stål, Enum. Hem. 1, 221, 1870.

Head rather short, first antennal joint scarcely or slightly passing apex of head, second and third joints about equal in length, fourth joint only slightly longer than first and strongly pubescent. Bucculae small, ending before the line of eyes. Beak extending beyond metasternum. Lateral margins of pronotum not crenulated. Median line of pronotum distinct, becoming very prominent on scutellum. Thorax

and corium coarsely punctate. Hind femora incrassated with rather short spines beneath. Size less than one-fourth of an inch. Color above a russet brown tinged more or less with rufous. Paler beneath. Membrane marked with a longitudinal obsolete brown line and small fuscous spots.

It is well distributed over the United States and south through Central America.

Harmostes subrufus Dist.

Harmostes subrufus Dist., Biol. Cent.-Amer. Hem. Het. Vol. 1, p. 167, 1893.

"Head, pronotum, and scutellum luteous, sparingly but coarsely punctate. Antennae ochraceous; basal joint incrassated and considerably passing the apex of head; second joint a little shorter than the third, fourth a little darker in color, thickened and about equal in length to the first. Pronotum with lateral angles rounded, sub-prominent, and slightly reflexed, a central longitudinal line and posterior margin narrowly pale luteous; two obscure fuscous fasciae near lateral margins. Scutellum with the lateral and apical margins and a central longitudinal line pale luteous. Corium testaceous, nervures and costal margins luteous. Membrane pale and hyaline. Underside of body and legs luteous; lateral margins of head and sternum strongly punctate. Long. 8 mm."

The above is a copy of the original description by Distant.

The species is known to occur in Mexico, Guatemala and southwestern United States. Four specimens in the collection of Mr. Bueno are the only ones of this species which I have examined, one of which is now deposited in the collection of the U. S. National Museum.

Harmostes croceus n. sp.

Resembles *subrufus*, but can be readily separated from it by the following characters: Second and third antennal joints equal, and lack of definite color markings or dark striations, its head, thorax, scutellum and corium being ochraceous and practically concolorous.

Basal joint of antennae extending beyond apex of head, second and third joints equal in length, fourth slightly longer than first and darker in color. Bucculae rather prominent, disappearing at line of eyes. Pronotum with lateral angles well rounded, slightly reflexed; lateral margins not crenulated. Veins of corium prominent. Posterior tibiae spinous. Rostrum not extending beyond metasternum. Breast fur-

rowed longitudinally for reception of rostrum. Antennae, head, thorax, scutellum and corium ochraceous, practically concolorous. Apex of corium slightly tinged with dark brown. Membrane hyaline. Ventral side of body light orange to yellow, concolorous. Length 7-9 mm. Sternum coarsely punctate.

Described from seven specimens from southern California. Have seen a single specimen from Oregon and one from Brewster County, Texas. Type and paratypes in collection of U. S. National Museum.

Harmostes marmoratus Spin.

Meroconris marmoratus Spin., Hist. de Chile, Gay, Vol. 7, p. 166, 1851.

Harmostes corazonus Dist., Trans. Ent. Soc. London, p. 85, 1893.

Head short, apex acute. First joint of antennae considerably passing apex of head, second and third joints short and about equal in length, fourth only slightly shorter than the third. Eyes prominent. Bucculae small. Beak not extending beyond metasternum. Lateral margins of thorax wide, entire, not crenulated. Posterior angles of thorax somewhat angular, not prominently rounded. Thorax coarsely punctate. Costal margins of corium practically parallel. Width between tips of corium greater than basal width of scutellum. Hind femora incrassated but not as pronounced as in other species. Size 5-6 mm. long.

General color above dark brown, corium except for the inner borders paler, beneath yellow, finely flaked with rufous. Membrane hyaline spotted with fuscous. Fourth antennal joint dark.

This species occurs in Chile.

Harmostes raphimerus Spin.

Meroconris raphimerus Spin., Hist. de Chile, Gay, Vol. 7, 1851.

Harmostes montivagus Dist., Trans. Ent. Soc. London, p. 85, 1893.

Head long, first antennal joint stout but considerably passing the apex of head, second shorter than the third and inflated at the base, fourth joint one-half the length of the third. Bucculae small. Beak extending to posterior margin of metasternum. Lateral margins of thorax entire, wide, and flaring. Posterior angles of thorax somewhat angular. Hemelytra widest at the middle. Hind femora not greatly incrassated, spines subprominent. Size 8-9 mm. long.

General color above yellowish brown, corium tinged with rufous posteriorly. Antennae ochraceous. Membrane hyaline, with faint fuscous spots.

This species occurs in Chile.

Harmostes bicolor Dist

Harmostes bicolor Dist., Biol. Cent.-Amer., Hem. Het., Vol. 1, 1893.

"Head testaceous, obscurely punctate. Antennae with the basal joint considerably passing the apex of the head, and much shorter than the second joint. Pronotum testaceous, coarsely punctate; lateral margins, a central longitudinal line, and posterior margin (narrowly) pale luteous; lateral angles subprominent. Scutellum testaceous, with the lateral and apical margins pale luteous. Corium pale luteous; clavus, inner apical angles, and a series of small spots on costal margin testaceous. (In the type specimen described, the left corium has a large testaceous basal patch on lateral margin, which is followed by a subquadrate spot of the same color.) Membrane pale hyaline. Under side of body pale greenish, with a few scattered black punctures; legs ochraceous. Long. 7 mm."

The above is a copy of the original description by Distant.

Its range in the United States includes southern California, New Mexico, Colorado and Texas. It also occurs in Mexico.

Harmostes reflexulus Say.

Syromastes reflexulus Say, Desc. New Sp. Het. Hem. of N. A., New Harmony, Ind., p. 323, 1831.

Harmostes costalis H. S., Wanz. Ins., ix. p. 276, 1853.

Harmostes bruesi Bergr., Ent. News, Vol. 24, p. 267, 1913.

Harmostes virescens Dall., List Hem. Ins. Brit. Mus. Part 2, 1852.

The following is a copy of the original description by Say and is in such detail that a redescription is not necessary:

"Reddish-brown; head carinate before. Inhabits Pennsylvania. Body reddish-brown, with rather large confluent punctures; head not extending more than half the length of the basal joint of the antennae, obviously carinate between the antennae, tubercles each side of the antennae acute: antennae, first joint robust, rough, much narrowed, second joint shorter than the third: terminal joint half as long as the third: thorax lateral margin a little reflected, the edge concavely arcuated: posterior angles rounded; anterior angles prominent, acute: scutel narrowed before the tip: hemelytra, corium yellowish, rufous near the scutel; nervures very distinct; lateral edge a little reflected: membrane hyaline: beneath greenish-yellow; feet pale rufous; posterior thighs dilated; spinous beneath. Length one-fourth of an inch. The rostrum hardly reaches the posterior coxae. The last joint of the antennae is elongate-oval and much shorter than the preceding joint, as defined by Latreille in this genus."

This species is distributed over the entire United States.

Harmostes minor Spin.

Merocoris minor Spin., Hist. de Chile, Gay, Vol. 7, p. 165, 1851.

Harmostes chilensis Dall., List. Hem. Ins. Brit. Mus. Part 2, 1852.

Head short, apex acute, first antennal joint considerably passing apex of head, second and third joints about equal in length, fourth about two-thirds the length of the third. Bucculae short, disappearing before line of the eyes. Beak extending beyond metasternum. Thorax coarsely punctured, lateral margins entire, wide, and somewhat flaring, posterior angles distinctly angular. Hind femora incrassated and with strong spines beneath. Size about 7 mm. long.

General color above greenish yellow to yellowish brown. Thorax tinged with rufous, scutellum distinctly yellow. Posterior border of thorax dark. Inner margins of corium distinctly rufous. Membrane hyaline. Yellow beneath.

Distribution includes southwestern United States, Chile and Argentina.

Harmostes obliquus Say.

Syromastes obliquus Say, Desc. New Sp. Het. Hem. of N. A., New Harmony, Ind., December, 1831.

There is considerable doubt as to this species. If it rightly belongs in *Harmostes* it could be distinguished from all other species by its remarkably small size, less than three-twentieths of an inch long. I have seen no specimen labeled "obliquus" and the original description is too meagre in structural details for me to attempt to place the species where it rightly belongs. I therefore simply append this species to the list of those belonging to this genus until the matter can be cleared up. Mr. VanDuzee, in his recent check list, inserts a question mark before the species. The following is a copy of the original description by Say:

"*S. obliquus*—all above punctured: rostrum and head rather short Inhabits the U. S.

"Body pale yellowish-rufous; head obviously punctured, not extending to the tip of the first joint of the antennae; antennae, first joint robust; second hardly two-thirds as long as the third; thorax with rather large punctures; no obvious transverse impressed line; hemelytra, on the corium with large separate punctures; posterior edge very oblique and elongated; membrane immaculate, undulated by the nervures; beneath more obviously tinged with rufous; feet paler; rostrum hardly reaching the intermediate coxae. Length less than three-twentieths of an inch. It may be distinguished by the remarkable obliquity of the terminal line of the corium."

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Three new West Indian Species of the Ichneumonid Genus *Eiphosoma* (Hym.).

By CHARLES T. BRUES, Bussey Institution, Harvard University.

The peculiar genus *Eiphosoma* is widely distributed in the American tropics, whence twelve species have already been described¹. In addition to these I obtained two others in Jamaica some years ago, and Dr. W. M. Mann discovered one in the neighboring island of Hayti. These are described on the following pages. The types are in the author's collection.

Eiphosoma luteum sp. nov. (Fig. 1).

♂. Length 12 mm. Almost entirely luteous, paler on the head and lower portions of the thorax; antennæ black, the scape and pedicel light brown below, darker above; basal joints of flagellum faintly tipped with pale yellow; ocellar area, connected with a large transverse marking on the occiput, black; teeth of mandibles black; middle lobe of mesonotum with a black spot in front, shading into a brown stripe behind; lateral lobes each with a brownish stripe; second and third abdominal segments black on upper edge except at tip; following segments similarly marked with piceous; tip of abdomen fuscous, external genitalia black; hind trochanters and femora at base and tip marked with fuscous; hind tibiae dark above and their tarsi entirely dark fuscous. Wings hyaline, with a weak, but distinct infuscated area at tip.

Head broad and thin; ocelli large, the lateral ones removed by less than their diameter from the eye, twice as far from one another as from the eye. Antennæ reaching to middle of the second abdominal segment, about 37-jointed. Face shining, sparsely punctate, almost smooth medially; clypeus strongly protuberant medially; malar space two-thirds as long as width of mandible at base.

Mesonotum sparsely punctate medially, shining, on the lateral lobes almost without punctures. Scutellum smooth and shining. Propodeum

¹ See Cockerell, Proc. U. S. Nat. Mus., Vol. 46, pp. 61-64 (1913).

subshining, microscopically rugose punctate, with a distinct but not very deep median longitudinal depression; with a complete lateral carina just below the spiracle and a transverse one before apex; basally with a less distinct carina on each side, enclosing a large area on each side of the median depression; spiracle elongate-oval; tip of propodeum extending to the basal fourth of the hind coxa. Pleurae shining; mesopleura sparsely, coarsely, punctate anteriorly and below, its oblique impression transversely striated except below; metapleura impunctate.

Abdominal petiole very little enlarged at tip and without punctures; its spiracles at the posterior third very prominent; following segments clothed with stiff black hairs; claspers rounded at apex. Tooth on hind femur acute, but not long. Wings without areolet; median and submedian cells of nearly equal length.

Type collected by the writer near Kingston, Jamaica, British West Indies. It was obtained in sweepings from the vegetation near the sea-coast in an extremely arid area at the mouth of the Hope River.

This species is easily recognized by its very pale color, punctuation of thorax, and prominent petiolar spiracles. It is quite similar to the following species:

Eiphosoma jamaicense sp. nov. (Fig. 2).

♂. Length 17 mm. Head, thorax and four anterior legs light yellow; abdomen and hind legs mostly fulvous. Body marked with black as follows: teeth of mandibles, wide stripe on front above antennæ enlarging to include the ocelli and widening to include most of the upper half of the posterior surface of the head, antennæ except scape and pedicel below and faint ring at tip of first two or three flagellar joints, a broad stripe narrowed behind on each mesothoracic lobe, groove at base of scutellum, anterior margin of propodeum and a longitudinal band on its dorsal surface extending from near the base to well beyond the middle, spot on posterior coxa above, upper edge of posterior trochanter, their tibiae except for their spurs and a broad band at the middle, and their tarsi, spot at apex of abdominal petiole above, line on upper edge of second segment except at apex and claspers. Posterior femora fulvous, with an incomplete dark band near base, a narrower one before apex and pale yellow tip. Wings hyaline, not distinctly infuscated at tip.

Ocelli in a low triangle, the posterior ones separated by about twice their own diameter, and removed by one and one-half times their diameter from the eye; face and sides of front coarsely punctate, the punctures more sparse near the middle of the face and on the

clypeus; antennæ 43-jointed: sides of face slightly convergent below; malar space slightly shorter than width of mandible at base.

Mesonotum coarsely and sparsely punctate, the punctures few and far apart on the lateral lobes; scutellum smooth. Propodeum coarsely, but indistinctly rugose-reticulate, with a transverse basal carina that touches the basal margin medially and curves backward just outside the spiracle to join a lateral carina that is continuous with a transverse subapical one; median depression well marked, almost entirely smooth; tip of propodeum extending to the basal fourth of the coxa. Pleuræ polished, mesopleura in front and below with irregular sparse punctures; oblique impression smooth.

Petiole of abdomen slightly and gradually enlarged at tip; its spiracles

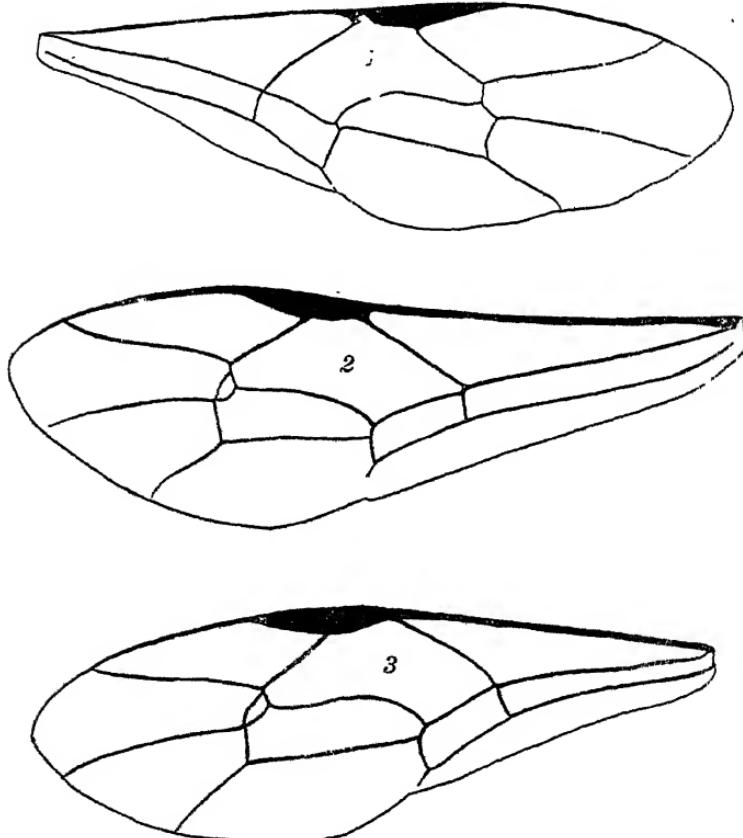


Fig. 1.—*Eiphosoma luteum* sp. nov. Fore wing of type.

Fig. 2.—*Eiphosoma jamaicense* sp. nov. Fore wing of type.

Fig. 3.—*Eiphosoma haitiense* sp. nov. Fore wing of type.

at the posterior third, not prominent; third and following segments with moderately prominent hairs; claspers with parallel sides, evenly rounded at tips. Tooth on hind coxae small, but very acute. Wings with a large areolet; submedian cell slightly longer than the median.

Type from near Kingston, Jamaica, British West Indies.

This species resembles *E. montaguense* Ckll. from Guatemala, but differs in the form of the claspers. It agrees quite well in color with Cresson's description of *E. vitticolle* (Proc. Ent. Soc. Philadelphia, 1865, p. 53), but Cresson refers to the areolet as minute in *vitticolle*, while it is larger than usual in the present form.

Eiphosoma haitiense sp. nov. (Fig. 3).

♀. Length (extended) 11 mm. Head, thorax and anterior legs lemon-yellow, marked with black; abdomen and hind legs fulvous, variegated with black. Antennæ 42-jointed, black except underside of scape and pedicel. Black body markings as follows: stripe above antennæ, half as wide as the front, including anterior ocellus; transverse spot enclosing posterior ocelli, narrowly separated from the frontal stripe; two almost contiguous spots on vertex, well separated from the ocellar spot; three stripes on mesonotum, the lateral ones narrowed behind; anterior margin of propodeum, suddenly enlarged laterally and almost contiguous with a lateral stripe extending back from the spiracle; median depression of propodeum; swollen part of petiole, a long stripe on mesopleura enlarged above, upper margin of second segment except tip, upper margin of third on anterior half and sheaths of ovipositor. Base and apex of hind femora above and hind tibiae except for lighter middle part, fuscous; hind tarsi piceous. Wings strongly infuscated at apex.

Eyes barely convergent below; sides of front rather closely punctate; face sparsely so, especially toward the middle; malar space slightly shorter than the width of mandibles at base. Ocelli in a low triangle, the lateral ones much closer to one another than to the eye-margin from which they are removed by a little less than their own diameter.

Median lobe of mesonotum closely punctate anteriorly, lateral lobes shining, impunctate except for a very few punctures near the middle. Propodeum highly polished, the median depression broad but only moderately deep; anterior transverse carina at the basal third, angularly bent forward near the middle and extending to the front margin to form the sides of a small area that is closed behind by a short transverse carina; posterior transverse carina complete, sinuous; lateral carina below the spiracle complete; pro- and mesopleuræ highly polished, the latter with a few widely scattered punctures below. Apex of propodeum extending to the basal fourth of the hind coxa.

Petiole of abdomen rather strongly, but very gradually widened at apex, its spiracles at the posterior third not at all prominent. Ovipositor as long as the three basal segments of the abdomen taken together. Hairs on abdominal segments sparse and weak. Tooth on hind femora well developed, acute; spurs of hind femora subequal, barely over one-third the length of the metatarsus. Wings with a rather large oblique areolet; median and submedian cells of equal length.

Type from Cape Haitien, Haiti; collected by Dr. W. M. Mann.

This is similar to *E. aztecum* to which it will run in Cockrell's table² and in my own³, but differs from the Mexican species by its much smaller size and in the color of the legs.

Dytiscus as a Destroyer of Mosquito Larvae (Col., Dipt.).

Larvae of dytiscids or diving beetles, the water tigers, have long been considered important enemies of the mosquito. Dr. J. B. Smith and others have performed laboratory experiments in which they showed that a single water tiger placed in a jar containing many mosquito larvae will kill or devour large numbers of them. Smith mentions (Report New Jersey State Agr. Exp. Station, 1904) a single experiment in which a water tiger killed or devoured 434 mosquito larvae in two days. He considers the water tigers as extremely important agents in the control of the salt marsh and fresh water mosquitoes.

The writer has observed in the field that many larvae are found in pools also occupied by the dytiscids. A few laboratory experiments showed that a single water tiger placed in a small jar containing many mosquito larvae did kill or devour tremendous numbers.

Three experiments were then performed in the laboratory using a few larvae only. Aquarium jars 11 inches in diameter and 7 inches in height were filled to about two-thirds their capacity with water. In each of them five water tigers were placed and were allowed to accustom themselves to their environment for a period of about an hour. Then to each of the jars were added 20 mosquito larvae of the second molt of the species *Culex pipiens*. At the end of 8 days jar No. 1 still contained 12 active mosquito larvae, jar No. 2 contained 9 living individuals and in jar No. 3 but 2 larvae remained. All the water tigers survived the experiment. Later experiments performed with single water tigers and the same number of mosquito larvae gave approximately the same results.

It would seem that the dytiscids may be of great importance in killing larvae when present in tremendous numbers, but that where the larvae are distributed pretty widely, there is little liability of their complete extermination by such an enemy.—F. E. CHIDESTER, Rutgers College, New Brunswick, New Jersey.

²Proc. U. S. Nat. Mus. vol. 46, p. 62. (1913).

³Psyche, vol. 18, p. 21 (1911).

New Species of *Lopidea* (Miridae, Hemip.)*

By HARRY H. KNIGHT, Ithaca, New York.

The writer here takes occasion to name and distinguish certain species of *Lopidea*, which are found in the eastern United States. In his studies on the structure of the male genitalia the writer has found characters which will give some structural basis for distinguishing the genus *Lopidea*. The broad and more or less flattened left genital clasper with bifurcated tip (figs. 1-3, 5), appears to be characteristic of all the species including *media* Say, the type of the genus. On the other hand, the structure of the right clasper gives a wide range of variation and thus good specific characters are obtained.

The genus *Lomatopleura* Reuter has supposedly been separated on the basis of the incrassate form of the second antennal segment. On that basis the writer has found it difficult to place one or two species in either *Lopidea* or *Lomatopleura* where the antennae are only slightly incrassate. The antennal character is further rendered more doubtful by the fact that each species in both genera has antennae of slightly different thickness. The thickness of the antennae has been found useful to separate the females of species which are otherwise very similar in coloration and structure. Thus far the writer has noted no difference in the thickness of the antennae between the sexes of a given species.

The species *caesar*, type of the genus *Lomatopleura* Reuter, has the same type of left genital clasper (figs. 1-3, 5) as that found in *Lopidea media* and other species of the genus as *robiniae*, *confluens* and *cuneata*. If *instabilis* were only the type of the genus *Lomatopleura* it might well stand on the basis of genital characters but unfortunately this is not the case. At present the writer prefers to consider all the species that have been placed under both genera as belonging to the genus *Lopidea* Uhler (1872).

*Contribution from the Department of Entomology of Cornell University.

The figures of the male genital claspers are all drawn to the same scale.

Lopidea heidemanni new species. (Fig. 1.)

In general appearance, most closely resembling *media*, but larger and usually with more fuscous; certain color phases of the female sometimes difficult to distinguish from the females of *media*.

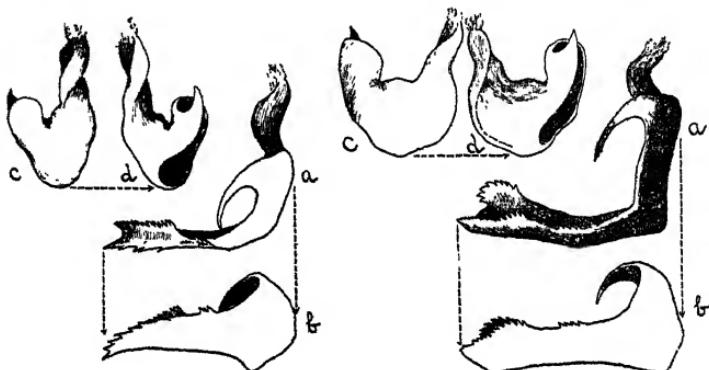


FIG. 1.

Fig. 1.—*Lopidea heidemanni*, male genital claspers—*a* right clasper, dorsal aspect.
b right clasper, caudal aspect.
c left clasper, ventral aspect.
d left clasper, dorsal aspect.

FIG. 2.

Fig. 2.—*Lopidea salicis*, male genital claspers—*a* right clasper, dorsal aspect.
b right clasper, caudal aspect.
c left clasper, ventral aspect.
d left clasper, dorsal aspect.

♂. Length 6.7 mm., width, 2.14 mm. Dark red, having more fuscous on the pronotum and scutellum than in *media*; larger and more elongate than *media*, the hemelytra always showing a strong tendency to shrivel and wrinkle longitudinally. The species may always be distinguished by the form of the male genital claspers (fig. 1); the right clasper showing a close relationship to *cuneata* and *salicis*.

♀. Length, 6.2 mm.; width, 2.08 mm. Slightly more robust than the male, otherwise very similar; the costal margins of the hemelytra frequently pale as in *media*; in certain color phases, dull orange red with fuscous.

Near Batavia, New York, the species was found breeding on elm (*Ulmus*), the nymphs feeding and maturing on the tender terminal growth, usually of young trees. At Four Mile, New York, nymphs were taken on Yarrow (*Achillea mille-*

folium) and when reared were found to be this species. This would indicate that the species has a wide range of food plants. The species was also taken in considerable numbers on *Solidago rugosa* in company with *media* where both forms were evidently breeding.

The species is named in honor of Mr. O. Heidemann, who was the first to recognize this form as an undescribed species. It is to be regretted that he never found time to publish on this and other forms that he knew.

Holotype: ♂, June 20, 1916, Batavia, New York (H. H. Knight); author's collection.

Allotype: topotypic.

Paratypes: 34♂ ♀ topotypic. 166♂ ♀ July 4-5, Four Mile; 3♂ 2♀ June 27, Honeoye Falls; ♀ June 27, Portage; ♀ July 16, Conesus Lake; ♀ June, 1911, Ithaca, all in New York and all collected by the writer. 2♂ 2♀ June 1, South Meriden, Connecticut, (H. Johnson). ♀ June 24, Bennington, Vermont, (C. W. Johnson). ♀ June 4, Westfield, New Jersey, (Wm. T. Davis). 2♂ ♀ June 4, Washington, and ♀ June 12, Brightwood, District of Columbia; ♀ Hensen Creek and ♂ May 24, Glen Echo, Maryland (O. Heidemann); also several other specimens in the Heidemann collection from the vicinity of Washington, D. C. 2♀ June, Black Mts., North Carolina (Beutenmüller). ♀ May 18, ♀ May 24, ♂ ♀ June 8, ♂ 2♀ June 17, Plummers Island, Maryland; ♂ May 19, Great Falls, and ♂ June 6, Mount Vernon, Virginia (W. L. McAtee). ♂ June 10, Tazewell, Virginia; ♂ Branchville to Beltsville, Maryland, (L. O. Jackson). 2♂ May 22, 23, Four Mile Run, Virginia; ♀ June 8, Conduit and Potomac Roads, Maryland, (A. Wetmore). ♂ May 31, Falls Church, and ♂ June 7, Great Falls, Virginia, (Nathan Banks). 2♂, Cleveland, Ohio.

Lopidea salicis new species. (Fig. 2.)

Closely related to *cuneata* but differs in the form of the male genital claspers and in having more orange color on the pronotum and sides of the hemelytra.

♂. Length, 5.7 mm.; width, 1.94 mm. Black, sides of the pronotum and basal angles of the disk orange colored; embolium and half of the cuneus yellowish to orange; species distinguished by the form of the male genital claspers (fig. 2).

♀. Very similar to the male in size and coloration, sometimes slightly more robust.

The species was taken by the writer only on the black willow (*Salix nigra*), and is apparently very scarce. The writer puzzled over the females for two years before the male was taken and the status of the species determined. The specimens from Honeoye Falls were taken on black willows found growing along the banks of a small stream that ran through an open pasture.

Holotype: ♂, June 27, 1916, Honeoye Falls, New York, (H. H. Knight); author's collection.

Allotype: taken with the type.

Paratypes: 2♂ 5♀, topotypic. ♀ June 30, 1914, Batavia, New York, (H. H. Knight). 2♀ June 23, 1914, Rochester Junction, New York, (M. D. Leonard).

Lopidea davisii new species (Fig. 3).

Short and robust, about the size of *media* but more robust; very similar to *confluens* in coloration.

♂. Length, 5.5 mm.; width, 2.0 mm. Yellowish orange to reddish; antennae, legs, front of the head and rostrum, black; calli, base of the pronotum, scutellum, clavus, inner half of the corium and the membrane, fuscous; species distinguished by the form of the male genital claspers (fig. 3).

♀. Very similar to the male only more robust.

This species is named in honor of Mr. Wm. T. Davis, who

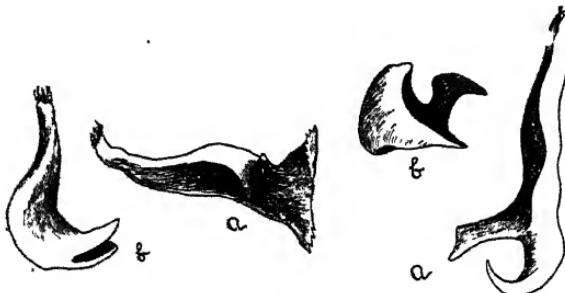


FIG. 3.

Fig. 3.—*Lopidea davisii*, male genital claspers—*a* right clasper, internal lateral aspect. *b* left clasper, dorsal aspect.

FIG. 4

Fig. 4.—*Lopidea staphyleae*, male genital claspers—*a* right clasper, dorsal aspect. *b* left clasper, caudal aspect.

is noted for his wide interest in collecting, he having taken the first specimens of this species seen by the writer.

Holotype: ♂, June 20, Cabin John Run, Maryland (Wm. T. Davis); author's collection.

Allotype: topotypic.

Paratypes: ♀, Half Way Hollow Hills, Long Island, New York (Wm. T. Davis). ♂ 3♀ July 6, near Chevy Chase Lake, Maryland (W. L. McAtee). 2♂ June 20, 24, Great Falls; ♂ July 2, Glencarlyn, and ♂ ♀ July 13, 8♂ 9♀ September 14, Falls Church, all in Virginia (Nathan Banks).

Lopidea reuteri new species. (Fig. 5.)

Very close to *caesar* in size and color but differing greatly in the form of the male genital claspers (fig. 5).

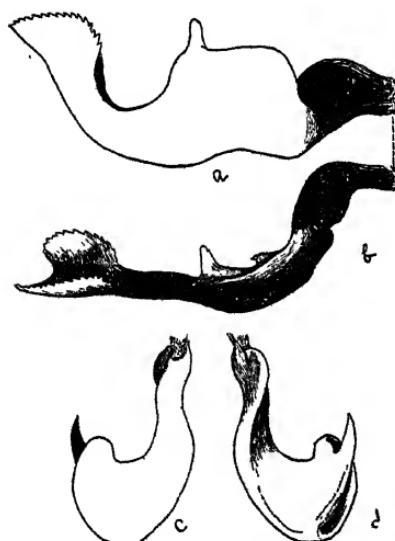


FIG. 5.

Fig. 5.—*Lopidea reuteri*, male genital claspers.
 a right clasper, lateral aspect.
 b right clasper, dorsal aspect.
 c left clasper, ventral aspect.
 d left clasper, dorsal aspect.

♂. Length, 7.1 mm.; width, 2.54 mm. Deep carmine red, fuscous on the scutellum and bordering the commissure of the hemelytra; not so broadly fuscous on the corium and cuneus as in *caesar*. Head mostly black, calli fuscous. Legs black; sternum, genital segment and usually the lower side of three adjoining segments blackish.

Antennae: segment I, length, .65 mm.; width, .17 mm.; II, 2.42 mm.; greatest width, .14 mm.; incrassate, tapering from the middle toward the apex; III, 1.60 mm., linear and slender; IV, .60 mm.; black, the first two segments clothed with prominent coarse hairs; almost identical in structure to *caesar*.

♀. Structurally and in color very similar to the male; no

antennal differences between the sexes. Very hard to distinguish from the female of *caesar*, which species usually has less fuscous shading on the scutellum.

In Missouri the species was found breeding on witch-hazel (*Hamamelis virginiana*) and probably has the same food plant in the northern localities.

Holotype: ♂, July 22, 1915, Hollister, Missouri, (H. H. Knight); author's collection.

Allotype: taken with the male.

Paratypes: 2♂, 18♀, topotypic. ♂ July 22, Ramapo (Wm. T. Davis), and ♂ July 27, Lake George (A. K. Fisher), New York. ♂ July 16, Southbridge; ♂ Aug. 3, Sharon; 2♂ Aug. 8, Chester; ♀ Aug. 11, Fall River; ♂ ♀ Aug. 31, Rutland; ♀ Aug. 7, Williamsburg, all in Massachusetts, (C. W. Johnson). ♂ July 10, Portland (A. E. Moss), and ♀ Aug. 10, Portland (B. H. Walden), in Connecticut. ♀ July, Hewitt, and ♀ July, Newfoundland, New Jersey (Wm. T. Davis). ♀ Sept. 6, Red Rock, Luzerne Co., Pennsylvania (Wm. T. Davis). ♂ July 25, Glencarlyn, and ♀ July 25, Paeonian Springs, Virginia (Nathan Banks).

Lopidea staphyleae new species. (Fig. 4.)

Resembling *robiniae* in general appearance but slightly larger and not so black on the dorsum; the male genital claspers distinctive of the species (fig. 4). The claspers of this species are not typical of the genus *Lopidea*, but until more work is done on the genitalia in the various genera it does not seem wise to erect new ones.

♂. Length 6.5 mm., width 2.05 mm. Orange yellow, fuscous on the calli, narrowly at the base of the pronotum, scutellum, apical two-thirds of the clavus, inner half of the corium, and membrane; antennae, tylus, two bars on the front, base of the head, rostrum, and legs, black; the fuscous shading on the dorsum much paler than in *robiniae*; genital claspers distinctive of the species (fig. 4).

Antennae: segment I, length .71 mm.; width .15 mm.; II, 2.48 mm., width .10 mm., tapering slightly smaller toward the apex; III, 1.82 mm., slender and almost linear; IV, .52 mm.

♀. Length 6.8 mm., width 2.2 mm. Similar to the male in structure and coloration, but usually slightly larger. Sometimes very similar in size and coloration to the female of *confluens*; but the length of the first antennal segment in *confluens* is shorter than the width of the vertex, while in *staphyleae* its length is as great as, or slightly longer than, the width of the vertex.

Holotype: ♂, July 29, 1916, Batavia, New York (H. H. Knight); author's collection.

Allotype: July 30, topotypic.

Paratypes: 2♂ 5♀ July 18, ♀ July 20, ♀ July 21, all reared; 12♂ 33♀ July 29, 4♂ 6♀ July 30, 1916, ♂ July 23, 1913, Batavia, New

York, all collected by the writer. ♂ July 13, ♀ July 14, ♀ July 19, 2 ♀ Aug. 9. Plummers Island, Maryland; ♂ Aug. 2, Scott's Run, Virginia (W. L. McAtee). 2 ♀ June 27, Great Falls, Virginia; ♀ June 23, ♀ July 1, High Island, (Virginia?), (Nathan Banks).

This interesting species was found breeding on the American Bladder nut (*Staphylea trifolia*) from which its name is derived. The nymphs were found feeding on the tender foliage during July, 1916, north of Batavia, New York, the first adults maturing on July 18. The nymphs are bright orange yellow with legs and antennae black, being very large and robust in the fifth instar. It was noted that many of the adults left the host plant shortly after maturing and were found congregating on nearby hickory trees where several pairs were taken in copulation.

Lopidea staphyleae var. sanguinea new variety.

Male genital claspers not differing from the typical *staphyleae* but the yellow color replaced by bright red; much resembling *reuteri* and *caesar*, but differing in the thickness of the antennae.

♂. Size, structure of the antennae and male genital claspers not differing noticeably from the typical *staphyleae*, but the yellow coloration replaced by bright red.

♀. Similar to the male in structure and coloration; very much resembling the females of *reuteri* and *caesar*, but the more slender form of the antennae will serve to distinguish this variety.

Holotype: ♂, July 4, Brookline, Massachusetts; author's collection.

Allotype: July 24, Mt. Carmel, Connecticut (W. E. Britton).

Paratypes: ♂, topotypic; ♀ July 14, Mt. Tom, Massachusetts.

Changes of Address.

G. W. Barber to U. S. Ent. Laboratory, Hagerstown, Md.

J. E. Hallinen, Cooperton, Kiowa Co., Okla.

Dr. H. M. Parshley to Biological Hall, Smith College, Northampton, Mass.

M. R. Smith to Care of Truck Crop Insect Division, Bureau of Entomology, U. S. Dept. Agric., Washington, D. C.

A new Species of *Apateticus* from Louisiana (Hem., Het.).

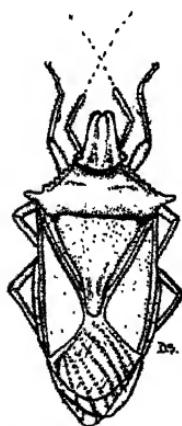
By DAYTON STONER, State University of Iowa, Iowa City,
Iowa.

In a small collection of pentatomids recently sent me by Mr. O. W. Rosewall, of the Department of Zoology and Entomology, University of Louisiana, I found a very interesting and peculiar specimen which I was unable to satisfactorily determine. A short time ago I sent this specimen to Mr. H. G. Barber, who confirmed my suspicion that it might be a new species. It is quite unlike any of our other species of the genus *Apateticus* and displays some interesting features.

Apateticus ludovicianus new species.

Elongate, narrow; general color above pale brown with a slightly olivaceous tinge; head and anterior one-half of pronotum pale clay yellow; humeri produced into acute, rounded points; costal margin of hemelytra with a conspicuous ivory-white line extending from base to membrane; median ventral spine very short, blunt.

Head elongate, depressed, sides nearly parallel, the juga only very slightly surpassing the tylus; an impressed line either side of the tylus and just outside this and parallel to it is a rather regular row of black punctures extending from base of head to tip of tylus. Outside each of these rows is another row of punctures extending from base of head to near apex and which is partly interrupted by the reddish ocelli; these punctures gradually become smaller and a little before the apex of the tylus the rows on either side become confluent. Dorsal surface of the head between the rows of punctures impunctate with rather sparse but fine subtransverse lines. Lateral margins of head with a row of black punctures extending from eyes to apex. An irregular, iridescent, greenish mark, deeply and coarsely punctured on outer side of antennal tubercle in front of eye. Eyes prominent, fuscous. Antennae with basal segment very short, pale clay yellow, a greenish-fuscous patch on outer side, which is continuous with the greenish mark on the tubercle; second segment a little more than four times as long as the first, vandyke brown, becoming darker toward tip, covered with fine, pale yellowish hairs; third segment about as long as second, blackish, paler at base and very thickly covered with pale hairs. The remaining antennal segments are missing. Rostrum heavy, pale yellow, darker toward apex, which reaches just to posterior end of metasternum.



Apateticus ludovicianus n. sp.

Pronotum pale brown behind the humeri where the fuscous punctures are rather dense and uniform; basal half strongly convex; anterior half pale clay yellow, irregularly and less densely punctate; a smooth, pale, transversely elongate spot either side of the median line; the acute, rounded humeri which are not at all inclined forward are joined by a raised, pale, calloused ruga in which are a few punctures; lateral margins nearly straight, evenly crenulate; a submarginal row of deep black punctures begins at the anterior border behind the eyes and becomes gradually evanescent as it approaches the humerus which it does not attain. Below the margin a row of black punctures with greenish reflections extends for about the same distance posteriorly as does the row of black punctures above; side pieces of thorax deeply, sparsely punctate. Scutellum long, narrow, olivaceous, regularly and deeply punctate with fuscous, the punctures diminishing in size toward apex; a median longitudinal paler line on posterior half.

Hemelytra a little narrower than widest part of abdomen, slightly darker than scutellum, irregularly punctured; costal margin with a uniform ivory-white line extending from base to membrane, this line finely, sparsely, irregularly punctate with reddish brown; membrane hyaline, translucent, without longitudinal vitta.

Venter pale clay yellow, irregularly punctured with fuscous, more sparsely and lightly punctate on disk; black spots on mid-ventral line small but sharply defined; the first and second are at the anterior edges of the fourth and fifth visible ventral segments respectively, while the third is very narrow and elongate, extending backward about two-thirds the length of the last segment. Connexivum pale yellow; immaculate at the angles, bordered within by a green, iridescent, heavily punctured area.

Legs pale clay yellow, impunctate. Apical tarsal segments and under sides of two proximal segments black, the upper side of these two segments yellowish.

Length to tip of membrane, 16.6 mm.; width across humeri, 8.75 mm.; length of head, 2.9 mm.; length of rostrum, 6.3 mm.

Described from a single female specimen collected at Baton Rouge, Louisiana, May 24, 1916. The specimen is now in my collection.

The Determination of Generic Types in the Lepidoptera.

By SIR GEORGE F. HAMPSON, Bart., 62 Stanhope Gardens,
London, S. W., No. 7.

In the NEWS, Vol. xxvii, No. 9, pp. 393-400 (November, 1916) Mr. J. H. McDunnough gives a list of corrections of

the names of genera of *Noctuidae* from those used in my volumes in the "Catalogue of Lepidoptera Phalaenae in the British Museum." It is instructive to compare his paper with what he wrote in the "Contributions to the Natural History of the Lepidoptera of North America," Vol. I, No. 6 (1912). The corrected names have since appeared in the most useful "Check List of the Lepidoptera of Boreal America," published by Dr. W. Barnes and himself. Many of his corrections are wrong, judged by his own method of selecting the types of genera as fixed by the "law of the first reviser." Of this, however, I will only give a single instance: in Haworth's description of the genus *Phytometra*, Lep. Brit., p. 254 (1809), the characters given for the genus include those of the larva and the generic name is taken from the habits of the larva. Now Haworth only knew the larvae of two of the species on his list, *festucae* and *gamma*, therefore one of them must be the type of the genus. Mr. McDunnough places both of them in the genus *Autographa* Hübn., and it was "ultra vires" on the part of Stephens and Westwood to "fix" the type of *Phytometra* as *ocnea* = *viridaria* Clerck, of which Haworth did not know the larva, and Mr. McDunnough is wrong in following them. *Plusia* Treit., type *amethystina*, is the same as *Telesilla* H. S. and has priority over it as stated in my Vol. xiii, p. 452. Ochsenheimer's generic names in the *Noctuidae* are nondescript and should date from Treitschke's descriptions in 1825, except such as were described by Latreille, Nouv. Dict. Hist. Nat. xxiii (bef. Sept. 1, 1818) and Zineken in Ersch and Grüber, Allg. Encyc. Wiss., Vols. i, iii, iv (aft. Sept. 1, 1818); in the *Geometridae*, however, as Treitschke is naming Schiffermiller and Denis' sections in the Wien. Verz., his names will date from 1825 and not from 1827-8.

The "law of the first reviser" claims that the first reviser, even if he does not "fix" a type for the genus, restricts the available species of the original author's list to such species as have the characters of the part for which he uses the restricted name, and that if there is only one such species on the original author's list that species automatically becomes the type of the genus, and so on with subsequent revisers till a type is "fixed" agreeing with the characters given by the original author. It would therefore be necessary to know not only all the characters of each species on the original author's list but to follow them through each subsequent revision. It is, I think, only necessary to state this in set terms to prove the absurdity of "the law of the first reviser" as a practical working system.

The revisions of the older genera are scattered through hundreds of books and periodicals, many of which are extremely rare, and many are in the various editions of old Encyclopedias. The advocates of the law mostly little know the hopeless morass they would land themselves in when attempting to use it. What the law really means is that the generic names to which its advocates are accustomed are sacred and to justify their use they quote a mass of old authors so that it would take an expert with a complete library at his disposal a week to unravel each case he wished to prove or disprove.

The only practical system for an individual author is when the type of a genus is not stated or clearly indicated by its author to take the first species on his list which agrees with the characters he gives as the type. The only alternative to this, if the "law of the first reviser" is finally adopted, is that an International Congress shall first lay down clearly the principles on which the types of genera are to be selected (not the half-thought-out recommendations of the Monaco Congress), then appoint small committees of experts in each order to draw up and publish lists of the genera in which the types have not been stated with their types as fixed on those principles, and that the work should be so well done that it will command almost universal acceptance; this will certainly not be done in the lifetime of the present generation.

There is another matter which will have to be settled if zoological nomenclature is to be rescued from the almost hopeless muddle into which it has been allowed to drift by each author and country using the generic names to which they are accustomed without any guiding principles, and that, if nondescript generic names are to be accepted or not, and, if not, whether they are to be considered as preoccupying the name for future use. In the whole of zoology these nondescript generic names are, I believe, used solely by the micro-lepidopterists and by some other American authors; the decision in this matter is of almost equal importance with that of the method of "fixing" the types of genera.

I am glad to see that Mr. McDunnough in the preface to Dr. Barnes and his Check-List of North American Lepidoptera discards Hübner's "Tentamen," but the status and date or dates of publication of Hübner's "Verzeichniss" is of far greater importance. The real genera for which structural characters are given in the "Verzeichniss" are the "Stirps" and Hübner's lower divisions, "Familiae" and "Coitus," are mere form and color sections and so considered by Hübner himself, and should

not, strictly speaking, be treated as generic names. In fact, Hübner's nomenclature, as also that of Linné, is only called binomial by a time-honored fiction. It is instructive to note that many of the old authors used the term "Family" as a subdivision of "Genus," as indeed is its proper meaning.

The date, or dates, of the publication of the "Verzeichniss" have always been open to much doubt and the dates given by D. Sherborn and L. B. Prout in the "Annals and Magazine of Natural History" (8), ix, pp. 179-80 (1912) are merely the approximate dates of the printing off of the various parts and not of their issue. As clearly pointed out by S. H. Scudder in his "Historical Sketch of the Generic Names Proposed for Butterflies," Salem, 1875, pp. 95-8, Hübner, in his preface to the first century of the "Zütrage," p. 5, dated December 22, 1818, refers to a work of the nature of the "Verzeichniss" as an unpublished desideratum and further not only are all the butterflies (with a few exceptions) of the first century of the "Zütrage" referred to by number in the "Verzeichniss" but a species—*Lycus niphon*—figured in the second century, which is dated December 23, 1822, is referred to both by number and name. Yet Scudder uses the date 1816 "for mere convenience and uniformity." The first two dates given by Sherborn and Prout, 1816 for pages 1-16 and 1818 for pages 17-80, are, therefore, proved to be erroneous. In 1820 Hübner stated that it was getting on very slowly: in 1825 he stated in Franck's Catalogue that 18 Bogen, i. e., 288 pages, were on sale (? printed off and ready for sale). In "Isis," xx, p. 103 (January 1827), there is a review of the "Verzeichniss" complete except for the Anzeiger (Index) of 72 pages, (? an advance copy whilst the index was being prepared). There is no mention of the "Verzeichniss" in contemporary literature, such as the "Allgem. Liter. Zeitung," with its reviews of the scientific work of the period, before 1828, when Treitschke begins to quote it in his Vol. vi (2), p. 72, after which he quotes it regularly. Ochsenheimer in the preface to his Vol. iv, p. 8 (1816) says that he had not seen a copy of Hübner's "Tentamen" till after his Vol. iii (1810) was in print; otherwise he would have quoted it before, and he quotes the genera from that date, therefore there was no prejudice against Hübner's methods as has been alleged. The only conclusion to be drawn is that no part of the "Verzeichniss" was published till some time in 1827 by Geyer after Hübner's death, and all the evidence there is is against its having been published before that date, which should be accepted unless some independent contemporary evi-

dence turns up. Plenty of copies exist in the original state of issue. They are all in a single blue paper wrapper without any printing on it, none in several wrappers.* Stephens in his "Ill. Brit. Ent. Haust." Vol. iv, p. 386 (1835) has a note on the "Verzeichniss" and gives an abstract of it and says that he had not been able to obtain it before; after this he quotes it systematically.

American authors, in the *Lepidoptera* at all events, and, I believe, universally, are to be congratulated on not having adopted the insidious German specific polynomial nomenclature, by which the specific name is broken up even unto the sixth degree (*vide* R. Verity's "Rhopalocera Palaearctica"), to which we in Britain have to a considerable extent succumbed of late years. There is no necessity whatever to give names to local, seasonal, sexual, polymorphic, hybrid, etc., forms, though in dealing with a species its local and other varieties should of course be described. There is no such thing in nature as a subspecies, if a form is not connected by intergrades with its nearest ally in another locality and does not interbreed with it, then it is a species; if this is not the case then it is a variety, geographical or otherwise, and the term "subspecies" is merely a confession of ignorance as to whether a form is a species or variety. The naming of minor varieties is rapidly reducing the whole subject to an unworkable farce and it is to be hoped that one of the minor benefits of the present war will be that we in Britain will return to a simple binomial nomenclature and purge ourselves from this form of "Kultur."

* Extract from letter dated November 12, 1894, from Sir M. Holzmann, Librarian at Marlborough House, to H. M., the late King Edward VII, to the Lord Walsingham in reply to enquiries as to the dates of Hübner's works, as to the results of his enquiries at the Berlin Royal Library.

"As nothing is said about the works being in their original wrappers, I conclude this is not the case. I confess that from the beginning I had my doubts on this point, as I know that in Germany books appearing gradually in parts used very rarely to be published in wrappers, but if so the wrappers had no printing at all. Even up to so late a time as 50 or 40 years ago the parts were issued just as they came from the press, each sheet separate, not even stitched or properly folded, and frequently with the title page and date of publication on the first sheet, although the last sheet might come out years after the publication of the first. I, myself, have bought many books in that condition when it is, of course, quite hopeless to attempt fixing the actual date of issue of each part."

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., DECEMBER, 1917.

The Convocation Week Meetings.

The annual meetings of the various national societies whose interests are wholly or partly entomological are announced for Pittsburgh and for Minneapolis.

At Pittsburgh will meet:

The Entomological Society of America on Friday and Saturday, Dec. 28 and 29; Secretary, Prof. J. M. Aldrich, West Lafayette, Indiana;

The American Association of Economic Entomologists on Monday, Tuesday and Wednesday, Dec. 31, Jan. 1 and 2; Secretary, Mr. A. F. Burgess, Melrose Highlands, Massachusetts;

The American Society of Naturalists on Tuesday and Wednesday, Jan. 1 and 2; Secretary, Prof. B. M. Davis, University of Pa., Philadelphia, Pennsylvania;

The Ecological Society of America on Saturday, Dec. 29, Monday, Dec. 31, and Tuesday, Jan. 1; Secretary, Dr. Forrest Shreve (address, Nov. 1-Dec. 27: Easton, Maryland);

These four societies meet in affiliation with the American Association for the Advancement of Science whose sessions extend from Friday, Dec. 28 to Wednesday, Jan. 2, both inclusive; Secretary, Dr. L. O. Howard, Smithsonian Institution, Washington, D. C.

At Minneapolis (University of Minnesota) will meet:

The American Society of Zoologists on Thursday, Friday and Saturday, Dec. 27-29; Secretary, Prof. Caswell Grave, Johns Hopkins University, Baltimore, Maryland;

On the same days will occur the meetings of the Federation of American Societies for Experimental Biology and the American Association of Anatomists.

Additional expenses of various kinds, including that of railroad fare, will doubtless disincline many from being present at these meetings, but the various Secretaries rightly urge the duty of attendance in view of the special stress of the times and the necessity for upholding scientific associations.

In recent years the News has given, usually in its February number, a classified list of all the papers of an entomological bearing presented at the preceding Convocation week meetings. Owing to our reduced size in 1918, as announced in our November issue, page 424, this list will be omitted next year, but we hope to give the usual brief summary and statistics of papers.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Entomology in British Columbia.

I am having sent to you a copy each of the Annual Report of the British Columbia Provincial Museum of Natural History for 1915 and 1916. The latter has only just come off the press. These reports contain illustrations of some of our rare and uncommon British Columbian insects and I thought that they may be of interest to you, especially as some of the figures are types and paratypes which are here illustrated for the first time. For the past two years I have been looking after the entomological branch of the Provincial Museum in my spare time. This branch had been rather neglected previously, but is now assuming a more complete aspect. I have persuaded the Director to have at least two plates each year devoted to the illustrating of rare and uncommon insects occurring in the Province, and as the general aspect of the report has been altered, I think that it may prove of some value to entomologists in general.—E. H. BLACKMORE, President, British Columbia Entomological Society, Victoria, B. C.

[The Report for 1915 notes the insect collections made by E. M. Anderson at Atlin in 1914 and at Sahtlam, Vancouver I., in 1915; by J. A. Munro at Okanagan Landing and C. Garrett at Cranbrook. Of the well-printed half-tone plates, one is devoted to types and paratypes of Geometridae described elsewhere by L. W. Swett, two to rarer butterflies (chiefly) and one to three new species of B. C. Diptera, described elsewhere by C. H. T. Townsend. The Report for 1916 indicates that Mr. Anderson made insect collections in the vicinity of Lillooet while Mr. Munro continued his work at Okanagan Landing; it contains also records of Noctuids from the vicinity of Victoria and of Geometridae from various B. C. localities by Mr. Blackmore. To each of these families a half-tone plate is devoted. We heartily second the hope expressed by Mr. Blackmore in another place in his letter that the B. C. Entomological Society may, in spite of its difficulties, soon issue numbers 8 and 10 of its Bulletin.—ED.]

Emergency Entomological Service.

Numbers 6 and 7 of these Reports, similar to the earlier issues mentioned in the News (*e. g.* Oct., 1917, page 375), dated Oct. 1 and Nov. 1, contain descriptions of the clean-up operations at Hearne, Texas, to exterminate the pink boll worm (*Pectinophora gossypiella*), presumably introduced with cotton seed from the Laguna district of Mexico. This pest was found in two fields near Hearne. Federal and State appropriations render it possible to establish a cotton-free zone as rapidly as the need of such a zone can be shown.

The present year has been one of the lightest boll weevil years since the pest entered the country. The first record of this species in South Carolina is given and data on the northern line of dispersion in Texas, Oklahoma, Arkansas, Tennessee, Alabama and Georgia; a complete statement of the infested territory, together with a map, is promised as soon as all the data have been received and compiled.

In California cotton has suffered materially from the activity of three sucking bugs, *Euschistus impictiventris*, *Chlorochroa sayi* and the tarnished bug, *Lygus pratensis*, which puncture the carpels and the green seed, resulting in complete destruction of the embryo, serious discoloration of the lint and premature opening of the bolls.

The State of Florida has issued a quarantine against sweet potatoes infested by the weevil *Cyclas formicarius* which occurs only in a few counties but is gradually gaining ground. The Federal Horticultural Board has under consideration a quarantine against sweet potatoes and yams from all foreign countries and from Hawaii and Porto Rico in view of the widespread ravages of this species and of the weevil *Eusceps batatae*.

Extension work in Entomology is being planned in States as far apart as Arizona and New Hampshire; this aims to give demonstrations at many places of the measures necessary to check or forestall insect ravages.

Numerous reports of injury to stored corn and wheat indicate that the more common grain weevils will be unusually prevalent during the coming winter.

The Bureau of Entomology's work is revealing the great economic importance of North American termites as destroyers of timber.

There are the usual reports on many species of injurious insects from 11 states in No. 6 and 22 states and territories in No. 7. We quote from one of these by Mr. A. L. Melander in No. 6: "I have just [September 18th] returned from an extended scouting trip which began about the middle of June. During the summer we have covered nearly 4000 miles, practically all in Washington, and over 3300 have been done by the little automobile. . . . In the State of Washington, [the weevil] *Otiorynchus ovatus* extends from north to south along a strip east of Puget Sound, invading the islands and

extending westward to Montesano. Most of the strawberry fields of this region are infested. In the region immediately east of Seattle, where the insect first entered the State fifteen years ago, the berry industry has been taken over almost entirely by Japanese who shift their fields as the weevils kill their plants. . . . Commercial cranberry growing in this State, although in its infancy, has already totaled over a million dollars invested. The principal trouble is occasioned by the fire worm which, in its several generations, drops the leaves, buds, blossoms and fruits, destroying not only the year's crop but, by attacking the terminal buds, prevents the next year's berries from forming. The growers certainly need advice and assistance as much as any people can. They are enthusiastic but helpless before this insect. They have equipped their bogs with piping and have installed engine sprayers so as to be in a position to carry on excellent spraying, but what is best and safest to use and just when the spraying should be applied are unsolved problems for which the growers are crying for professional advice, especially since this year their avertable losses have amounted to hundreds of thousands of dollars. . . . Perhaps the most valuable part of the summer's expedition was the information received and given during the personal visits with hundreds of farmers. The car enabled me to get off the beaten tracks and to run down scores of reported insect problems. With the camp outfit carried along we were made independent of hotels and railroads and thus were enabled to reach into many a region I never before have had the opportunity of visiting."

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded.

The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of papers containing new species are all grouped at the end of each Order of which they treat. Unless mentioned in the title, the number of the new species occurring north of Mexico is given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

- 1—Proceedings, Academy of Natural Sciences of Philadelphia.
- 2—The American Naturalist.
- 3—The Canadian Entomologist.
- 4—The Entomologist's Monthly Magazine, London.
- 5—The Entomologist, London.
- 6—Nature, London.
- 7—Annals and Maga-

zine of Natural History, London. 21—The Entomologist's Record, London. 51—Novitates Zoologicae, Tring, England. 68—Science, New York. 87—Bulletin, Societe Entomologique de France, Paris. 105—Videnskabelige Meddelelser, Naturhistoriske Forening i Kjobenhaven. 121—Archives des Sciences Physiques et Naturelles, Geneva. 150—Transactions, Royal Society of Edinburgh. 153—Bulletin, American Museum of Natural History, New York. 169—"Redia," R. Stazione di entomologia Agraria in Firenze. 177—Quarterly Journal of Microscopical Science, London. 179—Journal of Economic Entomology. 189—Journal of Entomology and Zoology, Claremont, Calif. 198—Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. 204—New York State Museum, Albany. 304—Annals, Carnegie Museum. 313—Bulletin of Entomological Research, London. 344—U. S. Department of Agriculture, Washington, D. C. 411—Bulletin, The Brooklyn Entomological Society. 420—Insecutor Inscitiae Menstruus: A monthly journal of entomology, Washington. 490—The Journal of Parasitology, Urbana, Illinois. 532—Proceedings, National Academy of Sciences of the United States of America, Washington. 538—Lorquinia, Los Angeles. 540—The Lepidopterist, Official Bulletin, Boston Entomological Club. 546—Illinois Biological Monographs, Urbana. 551—Memorie, Pontifica Accademia Romana dei Nuovi Lincei, Rome. 552—Science Progress, London. 553—Florida Buggist, Gainesville, Fla.

GENERAL SUBJECT. Cameron, S. E.—The insect association of a local environmental complex in the district of Holmes Chapel, Cheshire, England, 150, iii, 37-78. Chandler, W. J.—Investigations of the value of nitrobenzol as a parasiticide with notes on its use in collecting external parasites, 490, iv, 27-32. Chapman, T. A.—Two males paired with one female, 21, 1917, 182. Davis, A.—Insect collecting on a mountain trail, 538, ii, 17-18. Felt, E. P.—Household and camp insects, 204, Bul. 194. Gibbs, A. E.—Obituary notice, 9, 1917, 95. Grinnell, F.—The spirit of the naturalist and of natural history work; a suggestion for observation and record, 540, i, 53-4; 70. Krogh, A.—Injection preparation of the tracheal system of insects, 105, lxviii, 319-22. Meyrick, E.—A question of Latinity, 9, 1917, 114-5. Pickard-Cambridge, O.—Obituary notice, 9, 1917, 96. Rowland-Brown, H.—Insect disappearances and reappearances, 9, 1917, 92-4. Wodsedalek, J. E.—Five years of starvation of larvae, 68, xlvi, 366-7. Waterhouse, C. O.—Obituary notice, 9, 1917, 71-2.

PHYSIOLOGY AND EMBRYOLOGY. Gatenby, J. B.—The degenerate sperm-formation of moths as an index to the inter-

relationship of the various bodies of the spermatozoon, 177, lxii, 465-88. Muller, H. J.—An oenothera-like case in *Drosophila*, 532, iii, 619-26. Taylor, M.—The chromosome complex of *Culex pipiens*. II, Fertilisation, 177, lxii, 287-301. Warren, D. C.—Mutations in *Drosophila busckii*, 8, li, 698-703.

MEDICAL. Wilson, E. E.—The anopheles mosquito in relation to Malaria and agriculture, 553, i, 18-19, 22-3.

ARACHNIDA, ETC. Berlese, A.—Centuria di Acari nuovi, I-III, 169, xii, 19-67; 125-177; 289-338. Chinaglia, L.—Revisione del gen. "Hydrozetes," 169, xii, 343-59. Cohen, H.—Vitality of lice, 10, C, 66-7. Savory, T.—Further notes on captive spiders, 552, 1917, 322-24.

Ewing, H. E.—[Six] new sps. of economic mites, 179, x, 497-501.

NEUROPTERA, ETC. Hirst, S.—Remarks on certain sps. of the genus *Demodex* (of man, the horse, dog, rat and mouse), 11, xx, 232-5. Longinus Navas, R. P.—Neuroptera nova Americana, 551, ii, 59-80. Tillyard, R. S.—The biology of dragonflies. (Cambridge Univ. Press), 396 p. Williams, C. B.—A new thrips damaging orchids in the West Indies, 313, viii, 59-61.

ORTHOPTERA. Hebard, M.—Dermapterological notes; Notes on Mexican Melanoplus, 1, 1917, 231-50; 251-75. Rehn & Hebard—Studies in West Indian earwigs, 153, xxxvii, 635-51.

HEMIPTERA. Baker, A. C.—Some sensory structures in the Aphididae, 4, 1917, 378-84. The correct name for our apple-grain aphid, 68, xlvi, 410-11. Bodkin, G. E.—Notes on the Coccidae from Br. Guiana, 313, viii, 103-10. Gibson, E. H.—The collection of Hemiptera in the U. S. Nat. Mus., 179, x, 502-3. Gregory, L. H.—The effect of starvation on the wing development of *Microsiphum destructor*, 198, xxxiv, 296-303. Heidemann & Osborn—Rhynchota of the Isle of Pines, 304, xi, 346-55. McAtee, W. L.—A few notes chiefly on the names of Nearctic Tingidae, 411, xii, 78-9. Newstead, R.—Observations on scale-insects, IV, 313, viii, 1-34.

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THE BIOLOGY OF DRAGONFLIES (ODONATA OR PARANEUROPTERA) by R. J. TILLYARD, M. A. (Cantab.) B. Sc. (Sydney), Macleay Fellow in Zoology to the Linnean Society of New South Wales, Cambridge [England]: at the University Press 1917. New York representatives: G. P. Putnam's Sons. 8vo, pp. xii, 396, 4 pls. (2 colored), 188 text figs. Price 15 shillings net. (Cambridge Zoological Series, General Editor: Arthur E. Shipley, Sc.D., F.R.S., Master of Christ's College, Cambridge).

This volume whose appearance was alluded to in the News for October, page 353, contains the most complete general account of the Odonata ever published. Many of its contents are very suggestive and a much longer time must elapse before they can be properly

considered and tested. Such consideration might easily postpone the writing of an adequate review until the volume no longer had the charm of novelty, but we feel that it would be an injustice to the talented author, to his originality and his industry, to defer calling it to the attention of American entomologists until the reviewer felt that he had even partially digested its contents.

The book is an essential to every biological, zoological or entomological library. Its scope is shown by the following table of contents: Chapter I. Introduction, 8 pages; II. The Imago, external features and skeleton, 29 pp.; III. The Wings, 29 pp.; IV. The Larva or nymph, 33 pp.; V. The Alimentary and Excretory systems, 20 pp.; VI. The Nervous system, 17 pp.; VII. The Sense organs, 20 pp.; VIII. The Circulatory system, 9 pp.; IX. The Respiratory system, 36 pp.; X. The Bodywall and Muscles, 10 pp.; XI. The Reproductive system, 17 pp.; XII. Embryology, 14 pp.; XIII. Coloration, 15 pp.; XIV. Classification, 23 pp.; XV. Zoogeographical distribution, 20 pp.; XVI. The Geological record, 20 pp.; XVII. Bionomics, etc., 17 pp.; XVIII. British species [included presumably on account of the book forming one of the series above mentioned], 15 pp.; XIX. Collecting, rearing and biological methods, 10 pp.; Appendix A. Bibliography, 13 pp.; B. Glossary, 5 pp.; C. Some important synonyms, 1 p. Index of illustrations, 4 pp., Index of text, 12 pp.

Among the novelties adopted* may be mentioned the suggested phylogenetic succession of the pterostigma (pp. 52-53) and of the abdominal appendages of the imagos (pp. 35, 37); the view that the original Odonata were anisopterous as the Protodonata were (pp. 49, 51), that the basal fusion of veins *R* and *M* "was probably brought about, like the reduction in *Sc*, by the adoption of the aquatic habit by the larva, and the consequent shifting of the course of the oxygen supply of the developing wing from the costal to the anal end of the alar trunk," "owing to the larval gills being situated at the anal end of the body" (pp. 56, 46); the figuring of the hatching of the larva of *Anax* (p. 68); the treatment of the rectal gills of the larvae of the Anisoptera (pp. 178 *et seq.*), of their ontogeny (p. 186) and of the caudal and lateral gills of Zygopterous larvae (pp. 190-200); the phylogenetic treatment of color patterns (pp. 246 *et seq.*); the

* Many of these, indeed, have already appeared in Mr. Tillyard's numerous papers in the *Proceedings of the Linnean Society of New South Wales* for recent years, and in the *Journal of the Linnean Society of London, Zoology*, vol. xxxiii. Mr. Tillyard's interpretations of certain venational features are not discussed in this review; they have been criticised by Prof. Needham in the News for April last, pp. 169-173, and by Mr. Campion in a review of the present book in *The Entomologists' Monthly Magazine* for September, pp. 212-215.

correlation of colors with habits both imaginal and larval (pp. 248, 256), including change of color in the larva induced by color changes in its environment; in chapter XIV, alterations in classification whereby the family Lestidae is separated on entirely new characters, the genus *Epiophlebia* of Japan being included therein, and the elevation of many of de Selys' legions to the rank of subfamilies; the discussion of zoogeographical distribution under the headings of the palaeo-, ento- and ectogenic faunae (chap. xv); a new phylogenetic diagram (p. 319); an estimate of the flight-speed of dragonflies which in *Austrophlebia* is placed at "nearly sixty miles per hour" (p. 323).

Admirable features are the numerous original illustrations, some of them due to Mrs. Tillyard, the great majority of all the figures in the book having been made by the author from new material, as those of many wings, larvae, parts of the nervous system, sense organs and many viscera; the elaborate tables of equivalents in nomenclatures of wing-veins and -areas (pp. 40-43), of the muscles of the entire body of the imago (pp. 206-209) and of the census of the Odonata of the world (p. 300) in which the total number of species is placed at 2457 in 429 genera.

So excellent is this book that the reviewer wishes for it a wide and an intensive use and he would fail in his duty if he did not point out some details which seem to him to require correction, that it may be of the greatest value. The first sentence of chapter I implies that Linnaeus recognized a family *Libellulidae*, but Linnaeus' categories included no families and no group names terminating in *idae*; these are post-Linnean. Baron Edmond de Selys-Longchamps died December 11, 1900, not in 1890 (p. 2).

In the table on p. 92, the—sign for the appendix dorsalis in the column "Imagines Zygoptera" should be replaced by a X sign for "rudimentary" (cf. Hagen & Calvert, Bull. Mus. Comp. Zool., xxxix, pl. I, figs. 18 and 18c and explanation thereof, p. 119, under v). The statement that "In Zyopterid larvae the rectum is undivided" (p. 101, footnote) will require some modification, as work by Mr. Mitchell Carroll, not yet published, shows. The problem of "the missing abdominal ganglion," stated (p. 132) as solved in *Petalura*, had been solved in 1903 in the note cited as No. 28 of the bibliography on page 364.

Those interested in the physiology of the nervous system (pp. 135-136) will find additional data in the work of Babak and Foustka (1907) and of Matula (1911), as well as in Babak's summary in Winterstein's great *Handbuch der vergl. Physiologie* (1912-13). The expression "Closed System" applied to the dorsal vessel hardly seems appropriate, since the latter is truly said to open "into the haemocoele" (p. 157). Contributions to knowledge of spermatogenesis (p. 213) have been made since Bütschli by Lefevre and McGill (1908, 1912)

and by Gross (1912). In the discussion of germ bands (p. 233), the fact that other Odonate embryos than the one chiefly described (*Calopteryx*) have not immersed, but superficial, germ bands is not mentioned. Brandt's text and figures (reproduced as G and H on p. 231), as well as a consideration of the mechanics involved, necessitate the thickening and contraction of the serosa *after*, and *not before* (p. 238), the rupture of the fused amnion and serosa. The length of embryonic life is often more than three weeks (p. 242), in countries with a marked winter; the reviewer is accustomed to obtain young larvae of *Sympetrum vicinum* in Philadelphia for class work from eggs laid in late September or early October: kept indoors, these hatch in December and January; in their natural surroundings the embryonic period must be still longer. Semi-Arians of the twentieth century may reject Mr. Tillyard's "homochrome" (pp. 254, 257) for "homoeochrome," but, irrespective of orthodoxy, it may be questioned why "heteromorphic" should be employed in the sense of "rarer" (p. 257).

The characters for many of the taxonomic groups given in chapter XIV, such as "Triangles short" or "Triangle not excessively narrowed," without any accompanying mention of some neighboring structure or detail to be used as a scale in measuring the shortness or the narrowing, are not sufficiently precise to be available for purposes of identification, however meaningfull they may be to those already acquainted with the Odonata. The non-comparative nature of the tribal characters of the Libellulinae (pp. 269-273) makes determination of specimens exceedingly difficult, if not impossible. There is not space within the limits of this review to discuss the classification itself.

"Nebraska" (p. 282) is an error for "Nevada," and "*Diastatomma* Brauer" (p. 307, footnote) for "*Diastatomma* Burmeister-Charpentier." The fact that one specimen of *Phenacolestes parallelus* has been found with wings outspread* does not seem to the reviewer to justify the conclusion that this extinct genus used to rest in that position (p. 315). The condition shown by the fossil may only mean that the insect had been softened by water and its wings floated out into the attitude in which they are now found. Mr. Tillyard's own observations that females emerge, on the average, a few days before the males (p. 326) and that birds seldom succeed in catching dragonflies (p. 330) are not in accord with records from other sources. His method of "bristling" specimens, which does not include the head and prothorax (p. 355), is surely faulty, as everyone who has worked with the older collections, including that of de Selys himself, can

* Reference is doubtless made to figure 4, page 574 of volume xlvi, *The American Naturalist*, Sept., 1908.

testify. Nor can the keeping of insects in large tobacco boxes (p. 356) be endorsed, unless the Australian boxes are very much tighter than those of this part of the world, even if our practice does not always agree with our preaching! The presence of decaying vegetable matter is surely *not* essential in rearing the eggs of all Odonata (p. 358); in the annual case of *Sympetrum vicinum* mentioned above, no vegetable matter is employed.

The title of No. 22 in the bibliography (p. 364) is incorrectly given; the paper in question had not the wide scope which the misquotation implies. The larger German text-books are so extensive that the student will have some difficulty in finding the Odonata on "pp. 380 *et seq.*" of No. 81 in the same list (p. 367); "Allgemeiner Theil, 4te Lieferung, 1910," at least should be added to the citation. Some mention should be made in the bibliography, even with its limitations as laid down in the preface (pp. vii-viii), of the work of A. N. Barteneff on the Palaearctic fauna. In view of the use of the word *cell* in two distinct meanings on the same page (*e. g.* 244), it would seem desirable to include both meanings in the glossary (p. 377), as those who need the one would also require the other. On page 378 is the remark that the word *exuviae* does not exist in the singular and, although the Century Dictionary (not to quote others) supports this statement, yet *exuvia* and *exuvium* appear in at least one American entomological glossary and it is difficult to see why this is not as good neo-Latin terminology as many of our accepted generic and specific names.

Mr. Tillyard says in his preface (pp. ix-x): "Readers will . . . not fail to discover a very strong Australian 'flavour' in the book. Those who know how rich and varied the Australian Dragonfly-fauna is, will look upon this rather as an advantage than otherwise. While care has been exercised in selecting, for general description, well-known genera of wide distribution, yet there has been no hesitation in making use of the more archaic Australian forms, when these latter could throw new light on the phylogeny of the Order."

We welcome the Australian flavor and the ectogenic, if not entogenic, Australian authorship on this and other grounds as well. We look to younger continents, as well as to younger men, for new points of view, for liberation from the thrall of stereotyped ideas, and Mr. Tillyard has assuredly given us these in plenty in his *Biology of Dragonflies*.—P. P. CALVERT.

Abundance of *Sympetrum rubicundulum* (Odonata).

Sympetrum rubicundulum Say was exceedingly common in my garden as well as in those of my neighbors, at Mt. Airy, Pennsylvania, during the month of September, 1917. The nearest breeding place is at least a half mile from my home.—PHILIP LAURENT, Philadelphia, Pa.

Doings of Societies.

The American Entomological Society.

Meeting of June 11, 1917, in the hall of the Academy of Natural Sciences of Philadelphia. Dr. Henry Skinner, President, in the chair; nine persons present. Mr. C. W. Frost was elected a member.

The donations from Mr. Harry B. Weiss of specimens of *Diorymellus lacvimargo* Champ. and *Megastigmus aculeatus* Swed. and from Mr. Albert F. Swain of a collection of paratypes of Californian aphids were announced.

Orthoptera.—Mr. J. A. G. Rehn exhibited the Hebard collection of North American Blattidae, containing all the known species, and made interesting remarks on the history of the nomenclature and the distribution and habits of the species.

Odonata.—Dr. P. P. Calvert exhibited the type of *Miocora peraltica*, new genus, new species, from Costa Rica, described in Entomological News for June, 1917, and spoke briefly of its habitat and its generic differentials. He also exhibited two larval exuviae of *Hagenius brevistylus* which he had found on stones below a dam, on the banks of Darby Creek, above Heyville, Delaware County, Pennsylvania, June 18, 1916, and a female imago which he had taken on the bank of Crum Creek near Castle Rock, Pennsylvania, June 23, 1916, and suggested that members be on the lookout for this species of which there was only one previous record of its occurrence in the vicinity of Philadelphia, that of a nymph found in Fairmount Park in 1893, by the late C. F. Seiss (Ent. News, V, p. 324).

Lepidoptera.—Dr. H. Skinner exhibited the pupal skin of *Megathyrsus cofaqui* from which the insect, shown at a previous meeting, emerged June 8th. It was sent from Venice, Florida.

General.—Dr. P. P. Calvert exhibited some vials of alcoholic specimens of Arthropods from Costa Rican bromeliads and commented on them briefly, also parts of bull's horn thorn (*Acacia* spp.) and the ants (*Pseudomyrma* spp.) which inhabit this plant, from the same country. Referring to a course on the history of entomology which he had just been giving during the closing academic year at the University of Pennsylvania, he named the following naturalists selected for discussion in this course as having had great influence on the progress of entomology: Aristotle, Malpighi, Leeuwenhoek, Swammerdam, Redi, Reaumur, Roesel von Rosenhof, Ray, Linnaeus, Fabricius, Latreille, Cuvier, Lamarck, Savigny, Darwin, Wallace, Haeckel, Weismann and Lubbock; the time limits of the course prevented the inclusion of others.—R. C. WILLIAMS, JR., *Recording Secretary*.

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(* indicates *new* genera, species or varieties.)

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